WESTERN AUSTRALIA

REPORT

of the

COMMISSIONER

of

PUBLIC HEALTH

for the year 1956

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The Honourable Emil Nulsen, M.L.A.,
MINISTER FOR HEALTH

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Sir,

I have the honour to submit the Report of the Department of Public Health for the Year 1956.

LINLEY HENZELL, *M.D. (London), B.Sc., D.P.H.,*
Commissioner of Public Health.

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Department of Public Health

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REPORT OF THE COMMISSIONER

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TO THE HONOURABLE THE MINISTER FOR HEALTH.

I have the honour to submit the report of the Department of Public Health for the year 1956.

In the course of the year the population increased by approximately 18,000 and now amounts to 677,317.

The death rate was 8·23 per thousand of mean population—a figure slightly above that of the previous year which was 8·17, but approximately the same as that recorded within recent years.

The birth rate remains high at 24·98 per thousand population. Thus, the natural increase rate per thousand of mean population is 16·75.

The infant mortality rate remains low at 22·70 per thousand live births—a figure which, although not the lowest of Australian States, is low on a world standard.

These vital statistics express in a simple way that the general health and virility of the people are sound.

MEDICAL SCHOOL

It is pleasing to record that clinical teaching in the Sixth Year will take place in the Medical School of the University of Western Australia next year.

This Department is gratified in the appointments of Professor Gordon King as Professor of Obstetrics and Gynaecology and of Professor Neville Stanley, Professor of Microbiology. Both these gentlemen act as consultants to the Public Health Department and it may be confidently anticipated that the health services of the State will profit by their advice.

STATE HEALTH COUNCIL

During the year the State Health Council met once and there was one meeting of the Hospital Requirements Committee and the Maternal and Infant Health Committee.

Matters dealt with by the Council were as follows :—

1. *Rehabilitation Hospital.*—It was resolved that plans should be prepared and investigations should proceed for the establishment of a rehabilitation hospital on the Infectious Diseases Hospital site, Subiaco.

2. *Routine Examination of Rh Anti-body Titres in Pregnancy.*—The Council recommended to the Department that those patients who satisfy a means test at the King Edward Memorial Hospital should have routine examination of Rh anti-body titres in pregnancy provided free of charge.

3. *Eclampsia.*—A recommendation was made that eclampsia should be proclaimed a notifiable disease under the provisions of the Health Act and that, for this purpose, the Health Act should be amended.

4. *Insulcots.*—The Council made a recommendation that an Insulcot be installed at the King Edward Memorial Hospital in order that its efficiency could be determined before similar cots were acquired for other hospitals.

5. *Puerperal Pyrexia.*—The Council accepted the definition of puerperal pyrexia as used by the Royal College of Obstetricians and Gynaecologists reading as follows :—

> " A febrile condition occurring within 21 days of childbirth or miscarriage, in which a temperature of 100·4 degrees Fahrenheit or more has been substained during a period of 24 hours or has reoccurred during the period of 21 days ".

6. *Maternity Benefits for Unmarried Mothers.*—After protracted negotiations the Council's efforts to obtain maternity hospital benefits for unmarried mothers were successful.

With the inauguration of a Medical Faculty at the University of Western Australia and the commencement of the Medical School, it is anticipated that next year the constitution and composition of the State Health Council and its committees will be reviewed.

It is considered that this Council and its committees will be strengthened by including on them representatives of the Faculty.

LOCAL AUTHORITIES

Uncertainty still exists concerning the future of the boundaries of some local authorities in the metropolitan area. When this matter is finally resolved, it will aid local health administration and the co-ordination of the excessively large number of local services at present in existence.

FOOD AND INSPECTORIAL STAFF

Reference should be made to Appendix XVI in which is contained the report of Mr. C. E. Flower, Chief Inspector (General).

A considerable amount of work has been done on the control of pollution of the water of swimming pools and 350 samples of water were submitted for bacteriological examination.

The campaign against flies was increased in intensity and more work has been done on the use of insecticides.

The Annual Health Inspectors' Conference held in September was most successful and considerable interest was shown in the subjects discussed.

Pesticides

Nine meetings of the Pesticide Advisory Committee were held during the year.

Regulations governing the sale, labelling, and registration of pesticides were promulgated in April, 1956. By the end of the year, 321 applications for registration had been considered, of which 278 were approved.

HEALTH OF THE NATIVE POPULATION

Reference should be made to the report of Professor Ida Mann, the Department's Consultant Ophthalmologist, in Appendix XIV for the work which has been done on trachoma in the native population throughout the year.

There have been no significant developments in the health of the native population. In the opinion of the Public Health Department, the most serious problem in connection with native health is the tendency for natives to congregate in and around the townships, living in small communities at a very low hygienic and sanitary standard. This inevitable development and evolution of an under-privileged, insanitary and ever-increasing minority is fraught with considerable social risks for the future. The problem of the half-caste and township native is far more important and pressing than that of the aboriginal in the mission and in the bush.

PUBLIC HEALTH LABORATORIES

In the course of the year the Public Health Laboratories moved into new quarters of a recently completed section of the north-west wing of the Royal Perth Hospital.

Towards the end of the year, Professor Stanley, Professor of Microbiology in the University of Western Australia, took up duty at the University and in the Royal Perth Hospital, where he is the Director of the hospital's microbiology services. It is necessary for this new hospital department and the Public Health Laboratories to share accommodation for the time being. Professor Stanley is also Consultant Microbiologist to the Public Health Department.

The new Tuberculosis Laboratories attached to the additions to the Perth Chest Clinic also became available for use in the course of the year, enabling the Tuberculosis Section of the Public Health Laboratories to move out of the Royal Perth Hospital into this new accommodation. This move considerably eased the overcrowding and the dangerous conditions which were in existence.

In his report, Appendix II, Dr. Kovacs mentions that the total number of examinations made was 45,900, of which 14,714 were for the Public Health Department. A considerable amount of work continues to be done on cultures for individual antibiotic sensitivity tests, of which 110,420 were done in the course of the year.

Clinicians continue to have increasing difficulty with the antibiotic treatment of staphylococcal infections. In the course of the year some surveys were made of certain sections of the general population. 793 nasal swabs were taken and cultured and staphylococcus aureus was grown in 30 per cent. of these cultures. Acknowledgment should be made to the authorities and students of the University and the Teachers' Training Colleges at Claremont and Graylands for their co-operation.

As was to be expected, a high precentage of these cultures was sensitive to penicillin (approximately 80 per cent.) in contrast with only 20 per cent. sensitivity to cultures of staphylococci from hospital sources. This work is being continued.

Routine work on salmonellas continued throughout the year, including an increased amount of examinations on egg pulp prepared at Fremantle for export. Many technical difficulties have had to be and were overcome and Dr. Kovacs is to be congratulated on his work in this respect.

In diphtheria, cultural identification was facilitated by a modification of the Schroer fluid medium used on the subcultures.

At the end of the year, the Tuberculosis Laboratories in their new premises, and with the assistance of Mr. Foley, the Senior Technician, were being organised. It is expected that the rendering of reports to the Tuberculosis Control Branch will be facilitated under the new arrangements.

The use of the new blood medium has indicated the possibilities of an increased number of positive cultures.

In co-operation with the Department's Consultant Ophthalmologist, Professor Ida Mann, the identification of causative organisms in acute conjunctivitis has been carried out. Some specimens of Koch-Weeks' bacilli have been obtained. This work will continue.

Note should be taken of the improvements of the organisation for the despatch and reporting on specimens from country areas. It is considered now that the minimum time is taken over this difficult aspect of our country service as a result of these improvements.

Mr. Drummond, the Technical Officer, Serological Section, continues to do excellent work. In the course of the year 21,401 serological examinations were made, of which 16,897 were done for the Public Health Department and 4,504 for the Royal Perth Hospital.

TUBERCULOSIS CONTROL BRANCH

In his report (*see* Appendix III), Dr. Alan King, Director of the Tuberculosis Control Branch, comments on the low death rate from the disease.

The death rate from tuberculosis for the years 1953 to 1956 has been :—

	Pulmonary Tuberculosis	All Forms of Tuberculosis	
1953	6·9	7·4	per 100,000 of the population.
1954	8·9	9·5	
1955	4·7	5·0	
1956	6·3	6·8	

It would therefore appear that, for the time being, the death rate seems to have become fairly stabilised, and it would be unwise or unjustified to expect a marked reduction in the near future.

This low rate compares very favourably with world standards and is a tribute to the efforts which have been made in the past 10 years to control the disease.

Further evidence of this control is afforded by Dr. King in the results of the Mantoux survey of school children in the metropolitan area. In a comparison of the figures between the years 1949 and 1956 it is seen that, for example, in the age group 6 to 7 years, the percentage of positive reactors fell from 18 in 1949 to 2 in 1956. The percentage in the age group 9 to 10 fell from 30 to 3, and 12 to 13 from 51 to 16. This pronounced drop indicates that whereas half the school population had been infected by the time they had reached the age of 13 years, this number has now been reduced to one-third of this figure.

An index of the amount of work which has been done by the Branch since 1948 is shown by the fact that up to the end of December 1956, 587,221 microfilms had been taken by the Branch. This number excludes all routine microfilms taken in hospitals.

It is pleasing to note the co-operation which the Branch continues to receive from medical practitioners in private practice. For example, the number of large X-ray films of the chest referred by country doctors for an opinion increased by over 1,200 in the year and amounted to 8,605 for the whole year. As a result, 21 cases of pulmonary tuberculosis (2·4 per thousand of films referred) were notified and received treatment.

In the report of Dr. Heymanson, the Tuberculosis Physician, (*see* Appendix IV) it will be noted that of all X-ray examinations made at the Clinic (mass radiography and cases referred for X-ray by private practitioners), 184 cases of pulmonary tuberculosis were discovered and 34 cases of lung cancer.

The diagnosis of diseased conditions in the chest, other than tuberculosis, is one of the valuable functions of the Branch.

Dr. Elphick, Medical Superintendent of the State Sanatorium, Wooroloo, comments in his report (Appendix V) on the improved results of treatment and of the co-operation received from the surgical team headed by Mr. F. J. Clark and anaesthetists headed by Dr. Troup.

The work of the Sanatorium continues to be of a high order.

COMMUNICABLE DISEASES

In his report, Appendix VII, the Director of Epidemiology, Dr. Snow, draws attention to the position regarding poliomyelitis in the course of the year.

The State was affected by an epidemic in which there was a heavy incidence of respirator cases. The handling of these cases has been summarised by Dr. H. J. H. Colebatch, the Deputy Medical Superintendent of the Infectious Diseases Branch of the Royal Perth Hospital, in a comment which has been included in Dr. Snow's report.

In all, there were some 400 cases and 12 deaths.

The epidemic was caused by Type III virus which had not been previously encountered in this country.

The epidemic commenced in the first half of the year and the Department was in somewhat of a quandary as the immunisation programme using the Salk type vaccine prepared at the Commonwealth Serum Laboratories in Melbourne was due to commence in July. Fortunately, the epidemic waned and the immunisation programme was commenced in July according to schedule.

By the end of the year, about 100,000 children under the age of 15 had received two doses of the vaccine, and it is anticipated that almost the whole of the school population will have been completely immunised by the end of 1957.

It is gratifying to note that 97 per cent. of the parents gave permission for their children to be immunised. This remarkable response is very encouraging and is an index of the intelligent co-operation of the public with the Department. Tribute should also be paid to the Health Education Council which undertook the publicity in connection with this approach to the public for its co-operation. By this result alone, the Health Education Council has justified its formation.

Indications at the time of writing are that the incidence of poliomyelitis would seem to have been markedly reduced following on this immunisation of the child population of the State. However, it is still rather premature to draw any definite conclusions.

Dr. Snow and the staff working under him are to be congratulated on the smooth working of the Salk immunisation campaign.

Acknowledgment should also be made to the Education Department for their co-operation and, also, to local authorities, the Red Cross, Parents' and Citizens' Organisations, the Public Works Department and the Infant Health Section.

Dr. Snow's comments on an outbreak of contact-positives in diphtheria is interesting and worthy of close study.

The entomological survey was continued throughout the year and Mr. Britten's report (*see* Appendix VIIA), is attached to that of Dr. Snow.

It is remarkable that until this survey was commenced in 1953, very little information was available concerning insects of medical significance in this State. In the intervening period, a considerable amount of work has been done and the Department is now in a position to speak with some degree of authority concerning the distribution of possible insect vectors of disease.

This work would not have been possible without the expert guidance of Dr. E. P. Hodgkin of the Department of Biology, University of Western Australia, Mr. D. J. Lee of the School of Public Health and Tropical Medicine, Sydney, and Dr. Elizabeth Marks, Department of Entomology, University of Queensland.

This information concerning the State's entomological fauna will be sent to the Commonwealth Health Department, where, no doubt, it will be of value.

VENEREAL DISEASES

The Department suffered a great loss in the course of the year by the death of Dr. Mackenzie, who had been carrying on this work for the past 6 years. His kindly attention was much appreciated in the Clinic and he was greatly missed.

Dr. Frank Debney was appointed to fill the position and his report will be seen in Appendix VIII.

As in other similar clinics throughout the world, he comments on the apparently increasing prevalence of non-gonococcal urethritis in males, which accounts for approximately half of all cases seen.

STAFF PUBLICATIONS

The usual abstract of contributions to the literature in the course of the year by authors associated with the Department has been prepared by the Librarian, Mr. J. F. Woolcott (*see* Appendix XI).

MATERNAL HEALTH

Reference to Appendix XX shows that in the year 1956 there were 16,916 live births and that seven women died in childbirth or of complications associated with childbirth or pregnancy. This gives a maternal death rate of 0·53 per thousand live births, the lowest on record. The figures for the preceding five years are :—

1951	1·08
1952	1·17
1953	0·57
1954	0·75
1955	0·84
1956	0·53

However, with the comparatively few numbers of deaths every year, the addition or subtraction of one or two deaths will make an appreciable difference in this rate. One should therefore be cautious in predicting the future.

INFANT HEALTH

In Appendix XII will be seen the report of Dr. Elizabeth M. Gibson, the newly appointed Medical Supervisor of Infant Health.

Dr. Gibson was formerly one of the Department's School Medical Officers.

On the retirement of Dr. Stang, it was decided to divide the School Medical work from the Infant Health Section, and Dr. Gibson was subsequently appointed to the latter.

The infant mortality rate of 20·47 per thousand live births is the lowest recorded so far in this State and speaks well of the concerted measures which have been taken by all concerned in the care of mothers and infants.

The policy of the Government to provide subsidies for the capital cost of new Infant Health Centres continued throughout the year.

New buildings were opened at 12 centres and at the end of the year six were under construction.

There is still need for the building of a number of small centres which Dr. Gibson considers should be done in order to replace some of the very sub-standard premises being used at present " for want of better accommodation."

Three new caravans were provided during the year.

The Correspondence Section continues to give excellent service to mothers in outback areas. In addition, it is arranging to teach mothercraft by correspondence to school girls in the Murchison, and it is pleasing to note that a large number of native and half-caste girls are availing themselves of this. When the Correspondence Sister is in the district, she visits wherever possible those mothers and girls with whom she has been corresponding.

Five trips were made in the year on the transcontinental train service. Five hundred injections of Salk vaccine were given on these trips. By arrangement with the South Australian Government, this work has been continued over the State border. This example of inter-State co-operation is gratifying.

In the course of the year a new development occurred in the Department's organising an " in-service " course of training for some of the Infant Health Sisters in the health of the pre-school child. Up to the present, there has been an Infant Health Service and a School Medical Service, but little has been done for the child between the ages of two and six years other than occassional examinations by School Medical Officers at the few kindergartens in the State. The new policy is to encourage mothers to bring pre-school children to Infant Health Clinics for inspection by Infant Health Nurses. It is thus planned to extend the scope of the Infant Health Sister's work to include the pre-school child and to link up with the School Medical Service.

In the year, by the willing co-operation of the staffs of the Princess Margaret Hospital and the Child Guidance Clinic, this in-service course of training was carried on. Seven Sisters took the examination at the end of the course and did very well. As a result of this valuable experience, the course for next year might be modified.

SCHOOL MEDICAL SERVICE

In the course of the year a separation occurred in the control of the School Medical Service. Formerly, there was a combined appointment of Senior Medical Officer for Schools and Medical Supervisor of Infant Health. In May of this year this combined appointment was abolished and the School Medical Service re-organized, as outlined by a summary prepared by Dr. Davidson, the Deputy Commissioner of Public Health, in Appendix XIII.

Dr. Davidson's summary and appreciation make the position now clear.

It is expected that this re-arrangement will give the School Medical Officers an increased professional interest in the welfare and progress of the children in their respective regions.

Reference must be made again to the fact that too many schools where there is an adequate water supply, are not equipped with septic tank disposal of sewage but still rely on the obsolete and insanitary pan system.

Health education forms an important part of every school child, and it must seem rather incongruous for the children to receive instruction in school on sanitation and hygiene only to have placed at their disposal a pan system for sewage disposal. This Department cannot agree to the proposal that the provision of sanitary facilities at schools is of secondary importance.

REPORT OF THE CONSULTANT OPHTHALMOLOGIST

In a brief report (Appendix XIV) Professor Ida Mann, the Department's Consultant Ophthalmologist, outlines the work which has been done by her and the Ophthalmological Section in the course of the year.

Good results are being obtained by co-operation with the Education Department in the treatment and education of partially sighted children.

The work on trachoma has now been organized into routine surveys and treatment compaigns. It is anticipated that in several years time trachoma will be under control. More detailed reports concerning this work have already been published.

Some work has been done on purulent ophthalmia and this will continue.

SCHOOL DENTAL SERVICE

There is little fresh to report in the School Dental Service (*see* Appendix XV).

Although the school population has increased from 57,870 to 106,292 in the past eight years, the establishment of School Dental Officers at 14 remains unaltered. It is impossible for this staff to provide an adequate School Dental Service, and the necessity to restrict treatment of children of varying ages in accordance with the size of the school remains. It is disheartening for the Dental Staff to have to leave a district with their work incomplete.

While no decision has yet been made to fluoridate public water supplies, and while the diet of children remains unsatisfactory, there is a great need to provide adequate remedial treatment for the large amount of dental caries in our school population. With the School Dental staff available, this cannot be achieved.

NURSING BRANCH

In the course of the year, Miss Lee, Principal Matron, was awarded a Florence Nightingale Travelling Scholarship and left the State in May for an extended tour of the Eastern States, Britain, Europe, and the United States of America. In her absence her work was continued by Miss Railton, Assistant Principal Matron, whose report may be seen at Appendix XVII.

The Government School of Nursing has settled in to its new premises in Colin Street, West Perth.

In the course of the year, there were 110 application from girls at school for nursing bursaries, of which 67 were granted. It is anticipated that the granting of these bursaries will appreciably increase the number of trained nurses available to staff our hospitals in four or five years' time.

It should be noted that the programme of training nursing aides has been successful, is to be continued, and if possible, extended.

NURSES' REGISTRATION BOARD

See Appendix XVIII.

CONCLUSION

The co-operation of the staff has, as usual, been most helpful and gratifying. Finally, Sir, the work of a department with many facets and responsibilities has been made much easier by your sympathy, understanding and tolerance.

LINLEY HENZELL, M.D. (London), B.Sc., D.P.H.,
Commissioner of Public Health.

Appendix I.

VITAL STATISTICS – WESTERN AUSTRALIA.

——	1954.	1955.	1956.
Mean Population—			
Males	330,350	339,137	348,835
Females	309,790	319,610	328,482
Total	640,140	658,747	677,317
Births—			
Males	8,136	8,436	8,870
Females	7,792	8,187	8,046
Total	15,928	16,623	16,916
Birth rate per 1,000 of mean population	24·88	25·23	24·98
Deaths—			
Males	3,203	3,106	3,265
Females	2,161	2,273	2,307
Total	5,364	5,379	5,572
Death rate—rate per 1,000 of mean population	8·38	8·17	8·23
Natural increase rate per 1,000 of mean population	16·50	17·06	16·75
Infant Mortality per *1,000 births—			
Metropolitan area	19·59	22·50	17·87
Rest of State	25·38	22·37	27·82
Whole State	22·54	22·44	22·70
Stillbirths—			
Metropolitan	129	114	111
Whole State	270	239	226

* Excluding Stillbirths.

Comparison of Infant Mortality and General Death Rate.

Place.	Infant Mortality.			General Death Rate.		
	1954.	1955.	1956.	1954.	1955.	1956.
New Zealand (*a*)	19·99	20·09	19·24	8·98	8·95	9·00
Western Australia	22·54	22·44	22·70	8·38	8·17	8·23
New South Wales	25·30	24·86	23·48	9·46	9·32	9·58
Victoria	19·30	18·37	19·3	9·19	8·92	9·17
Queensland	22·29	20·28	22·74	8·64	8·44	8·92
Tasmania	23·94	23·37	21·10	8·67	7·87	7·80
South Australia	21·29	23·30	19·88	9·01	9·19	8·95

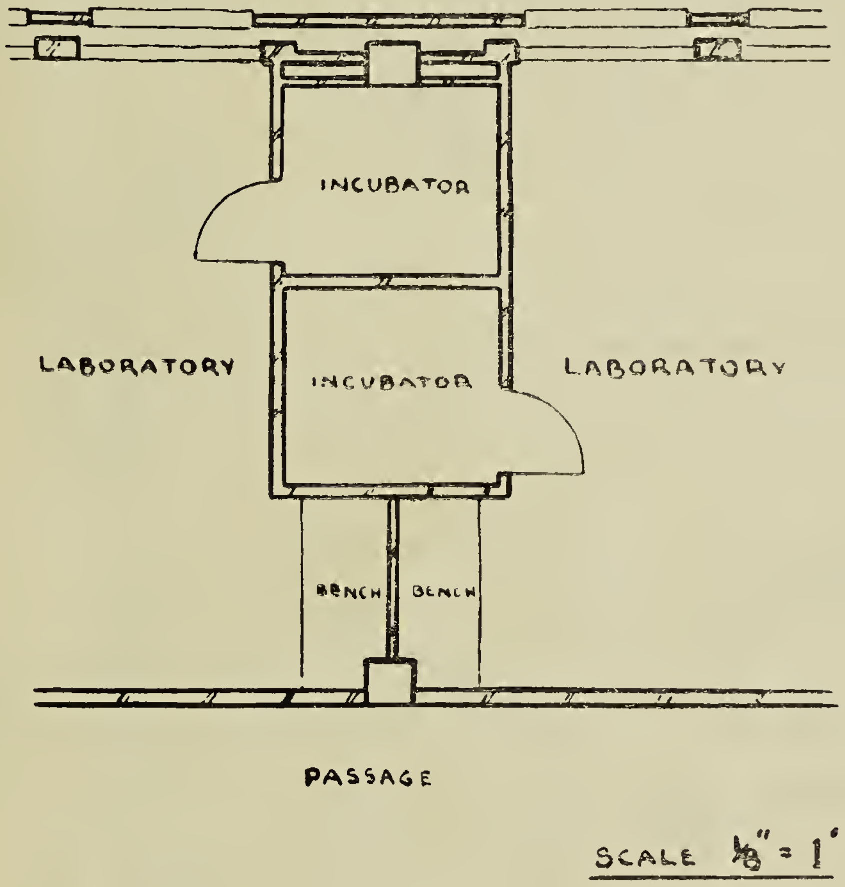
(*a*) Non-Maori.

Appendix II

PUBLIC HEALTH LABORATORIES

To the Commissioner of Public Health.

The most important event of the year was the completion of the new *Public Health Laboratories.* The laboratories were planned on a large scale as it was intended to provide working space for the material of both the Public Health Department and the Royal Perth Hospital. Besides the routine laboratories and the research laboratories, an isolation laboratory unit (comprised of a laboratory, disinfection room, animal inoculation room and shower and locker room) was included in the new premises. The main principle of the design was to place the laboratories on either side of a corridor with glass windows inset into the walls, so that the major portion of the laboratories could be seen from the corridor. A novelty in our new design was the set up of the *incubator rooms* and the *microscope bays.* Usually the incubator room protrudes into the laboratory and produces unwanted corners and is, aesthetically, not ideal, whereas in our plan the incubator rooms and the microscope bays provide the partition between two laboratories, as can be seen from the self explanatory figure.



After planning and waiting for several years for the completion of the Public Health Laboratories, the new premises were divided, just after they were finished, between the Public Health Laboratories, and the Microbiological Department of the Royal Perth Hospital which is combined with the Medical School of the University.

Routine Examinations.—The number of examinations carried out in 1956 in the Public Health Laboratories as compared with those in 1955 is illustrated in Table No. 1.

There has been a general decrease in the number of examinations in all sections excep for M. tuberculosis and M. leprae for the Department of Public Health where there has been an increase of 543 or 12·83 per cent. over the 1955 figures.

During 1956, the overall decrease in Public Health Laboratories' examination was 7,959 (14·75 per cent.). This was made up of a decrease in the work for the Royal Perth Hospital by 5,154 examinations (15·09 per cent.) and for the Department of Public Health by 3,013 (23·38 per cent.). There was also a small decrease in the M. tuberculosis figures for the Royal Perth Hospital of 335 (12·5 per cent.).

However, the figures for 1955 do not give a reasonable comparison as the diphtheria epidemic which took place early in that year accounted for an exceptionally large increase in general bacteriological figures for 1955. When the figures for 1956 are compared with those of 1954 there is an increase in all sections.

Table 1

Statistics of Bacteriology Laboratories

	1955.			1956.		
	R.P.H.	D.P.H.	Total.	R.P.H.	D.P.H.	Total.
Bacteriology without M. tuberculosis and M. leprae	34,085	12,952	47,037	28,931	9,939	38,870
M. tuberculosis and M. leprae	2,680	4,232	6,912	2,345	4,775	7,120
Bacteriology—Total	36,765	17,184	53,949	31,276	14,714	45,990

The monthly distribution of the examinations can be seen in Table 2.

Table 2

——	Jan.	Feb.	Mar.	Apl.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total, 1956	Total, 1955	Increase or decrease per cent.
General Bacteriology—															
Royal Perth Hospital	2,276	2,413	2,001	2,391	2,797	2,744	2,543	2,732	2,532	2,865	2,252	1,385	28,931	34,085	— 5,154 =, — 15·09%
Public Health Department	632	617	642	619	676	567	586	1,318	1,458	1,358	756	710	9,939	12,952	— 3,013 = — 23·28%
M. tuberculosis and M. leprae—															
Royal Perth Hospital	301	175	123	108	164	146	193	234	309	218	228	146	2,345	2,680	— 335 = — 12·5%
Public Health Department	335	491	422	317	440	249	378	426	496	530	387	304	4,775	4,232	+ 543 = + 12·83%
Total Number of Examinations	3,544	3,696	3,188	3,435	4,077	3,706	3,700	4,710	4,795	4,971	3,623	2,545	45,990	53,949	— 7,959 = — 14·75%

The distribution of the specimens was as follows :—

Table 3

Examinations	R.P.H.	P.H.D.	Total.
Bacteriology—			
Animal Inoculations (excluding Tb inoculations)	45	40	85
Blood Cultures	380	40	420
Brucella Cultures	13	17	30
Burn Swabs	111	1	112
C.S.F.—(a) culture	384	53	437
(b) micro	469	64	533
Dark Ground Examinations	18	....	18
Ear and Eye Swabs Culture	78	37	115
Fluids, serous cavities—(a) culture	105	12	117
(b) micro	105	12	117
Faeces—(a) culture	317	144	461
(b) micro	151	33	184
Fungi examinations	10	3	13
Gonococci—(a) smears	77	1,362	1,439
(b) cultures	39	9	48
K.L.B., Swabs for	2,742	2,744	5,486
Other throat swabs—not K.L.B.—(a) culture	38	84	122
(b) micro	4	1	5
Nasal swabs	4	920	924
Pus cultures	1,617	159	1,776
Sensitivity Tests	10,227	815	11,042
Sputa—(a) culture	798	52	850
(b) micro	267	9	276
Urine—(a) culture	4,899	265	5,164
(b) micro	5,353	278	5,631
Vaccines—auto.	9	30	39
Vaginal swabs—(a) culture	130	40	170
(b) micro	135	40	175
Wound swabs	304	5	309
Miscellaneous	17	7	24
M. tuberculosis (including animal inoculations)	2,338	4,509	6,847
M. leprae	7	266	273
Milk	27	38	65
Frozen foods	....	83	83
Tinned foods	....	12	12
Miscellaneous	....	69	69
Rat Survey	....	38	38
Sterility Tests	20	1	21
Water—(a) drinking	6	1,669	1,675
(b) river, ocean	....	560	560
(c) sewerage	....	114	114
(d) Moore swabs	....	39	39
Blood films—Malaria	1	5	6
Faeces—(a) Amoebae	18	15	35
(b) Worms or ova	2	5	7
Vaginal smears for Trichomonas	11	1	12
Miscellaneous	....	14	14
Total	31,276	14,714	45,990

Antibiotics Sensitivity Testing as a Guidance to Treatment.

The following points guided us in the selection of antibiotics :—

1. The exact *aetiological diagnosis* of the infection should be made.
2. The *sensitivity* of the microbe should be *determined.*
3. In cases of lobar pneumonia, streptococcal sore throat, gonorrhoea etc., the clinical diagnosis is sufficient to start antibiotic therapy. But it is also advisable in these cases to send specimens for bacteriological examination before chemotherapy is commenced.
4. In infections caused by staphylococci, Ps. pyocyanea, the proteus species and enterococci, the treatment should start, if indicated, on the basis of the " best guess." The sensitivities of these species can be seen below under special headings. When the exact antibiotic sensitivity is known the treatment could be changed accordingly.

The importance of the exact bacteriological diagnosis is shown best by the different pattern of the resistance of the various types of proteus bacteria.

The laboratories performed 110,420 *individual sensitivity tests* and prepared the discs for them. Penicillin testing was done in two concentrations using 1 and 10 unit discs.

The following concentrations of the sensitivity discs were used :—

Penicillin	1 and 10 units per disc
Streptomycin	10 mcg per disc.
Chloramphenicol....	30 mcg per disc.
Tetracycline	30 mcg per disc.
Oxytetracycline	30 mcg per disc.
Chlorotetracycline	30 mcg per disc.
Erythromycin	10 mcg per disc.
Bacitracin	10 units per disc.
Polymyxin B	100 units (10 mcg) per disc.
Sulphadiazine	0·25 mg per disc.
Gantrisin	0·25 mg per disc.
Furadantin	150 mcg per disc.

Staphylococcus aureus, haemolyticus, coagulase positive.

The results of antibiotic sensitivity of the *Staphylococci* isolated by the Public Health Laboratory during the years 1954, 1955 and 1956, are shown below. In 1956 there were 1,375 strains isolated from Royal Perth Hospital and 141 strains from patients mainly from private practitioners.

Percentage of Sensitive Strains

Antibiotic and Chemotherapeutic	Royal Perth Hospital			Public Health Material.	
	1954	1955	1956	1955	1956
		1,386 strains	1,375 strains	210 strains	141 strains
	%	%	%	%	%
Penicillin—1 unit	21	17	19	29	30
Penicillin—10 units	....	34	22	....	34
Streptomycin	85	47	49	87	96
Chlorotetracycline	91	72	78	94	99
Oxytetracycline	89	62	72	95	99
Tetracycline	89	60	59	90	92
Chloramphenicol	95	98	99	99	100
Erythromycin	100	98	98	100	100
Bacitracin	98	95	99	98	100
Sulphadiazine	....	23	17	31	36
Gantrisin	....	26	31	35	43

An acknowledgment must be made to Dr. D. J. R. Snow, State Director of Epidemiology, for his keen interest in the problem of staphylococcus carriers. His encouragement and enterprise made it possible for us to initiate a survey among the *general population* of Perth. 793 nasal swabs were collected from students of the Graylands Teachers' College, the Claremont Teachers' College and the University. From all these students, staphylococcus aureus was found in the anterior nares of 257 (29·9 per cent.) cases.

Staphylococcus aureus haemolytic carriers

Source of Swabs		Staphylococcus aureus, haemolytic strains		Strains sensitive to Penicillin				Strains resistant to 10 U Penicillin	
				1 unit		10 units			
		No.	%	No.	%	No.	%	No.	%
Graylands Teachers' College	230	53	23	42	79	49	92	4	8
Claremont Teachers' College	340	92	27	75	82	81	88	11	12
University (students)	323	92	28	69	75	73	79	19	21
Total	893	237	27	186	79	203	86	34	14

All strains were sensitive to streptomycin, chlorotetracycline, oxytetracycline, chloramphenicol, erythromycin and bacitracin. 62·9 per cent. of the strains were sensitive to sulphadiazine.

The results give an interesting picture when the sensitivities of the staphylococci from specimens from the Royal Perth Hospital ("Hospital Staphylococci") are compared with the sensitivities of strains isolated from pathological material of the Department of Public Health, which mainly comes from patients of private practitioners, and from nasal carriers among the general population of Perth.

The important fact was that, as expected in healthy carriers, a high percentage of the staphylococci were sensitive to *penicillin.* 78·5 per cent. of the strains were sensitive to one unit and 85·7 per cent. to 10 units of penicillin, in contrast to 19 per cent. and 22 per cent. respectively of the "Hospital Staphylococci" and 30 per cent. and 34 per cent. of the staphylococci cultured from material outside the hospital. Again, unlike the staphylococci from pathological material, all the strains isolated from the healthy carriers were sensitive to streptomycin, the three tetracyclines, chloramphenicol, erythromycin and bacitracin. It is also worth while to mention that 62·9 per cent. of the "carrier" strains were sensitive to sulphadiazine.

The increased resistance of staphylococci to 10 units of penicillin should be noted. Most of the strains which were resistant to 1 unit of penicillin were also resistant to 10 units, as against our results in 1955 where a significant difference was observed.

Our material does not support the theory that there is an increased pathogenicity or virulence of staphylococci. Yet, the increased occurrence of *staphylococcal bacteraemia* should be mentioned. During 1956 staphylococci were cultured on 32 occasions from the blood from *fourteen* cases as against only 5 cases in 1955.

Enterococcus

We cultured 265 strains of *Enterococci* during the year and the list of sensitivities is given below :—

	Per cent.
Penicillin	9
Streptomycin	36
Chlorotetracycline	57
Oxytetracycline	50
Tetracycline	43
Chloramphenicol	98
Erythromycin	98
Bacitracin	96
Sulphadiazine	0·5

The ineffectiveness of penicillin with the moderate sensitivity of the tetracyclines and streptomycin should be noted. Chloramphenicol, erythromycin and bacitracin were highly active against enterococci.

Sensitivity of Ps. pyocyanea

We continued to do the preliminary diagnosis of Ps. pyocyanea by the Oxidase reaction introduced by us. Pigment production or, in its absence, the utilisation of citrate on Simmons medium, haemolysis on horse-blood-agar plate, gelatine liquefaction and glucose fermentation, in the absence of the utilisation of the other common carbohydrates, served as confirmatory tests.

The sensitivity of 309 strains from hospital patients was as follows :—

	1955 Per cent.	1956 Per cent.
Streptomycin	12	27
Chlorotetracycline	41	51
Oxytetracycline	87	91
Tetracycline	16	18
Chloramphenicol	18	27
Polymyxin B	97	95
Sulphadiazine	31	41
Gantrisin	15	14

As can be seen polymyxin B and oxytetracycline are the antibiotics of choice in Ps. pyocyanea infection. These are followed in their effectiveness by chlorotetracycline and chloramphenicol. There was a significant increase in the sensitivity of Ps. pyocyanea to streptomycin. As before, this species was relatively insensitive to tetracycline. The high activity of sulphadiazine in 41 per cent. of the strains should be noted.

Sensitivity of the Proteus Strains

The sensitivity of 725 Proteus strains cultured from Royal Perth Hospital specimens can be seen below :—

Chemotherapeutics.	P. vulgaris		P. mirabilis		P. morgani		P. rettgeri	
	1955	1956	1955	1956	1955	1956	1955	1956
	%	%	%	%	%	%	%	%
Streptomycin	28	59	57	66	60	69	1	10
Chlorotetracycline	67	59	16	12	55	44	....	7
Oxytetracycline	78	57	14	11	49	55	8	7
Tetracycline	61	47	8	18	51	48	4	3
Chloramphenicol	89	98	93	98	89	93	43	66
Sulphadiazine	61	63	77	74	60	70	10	7
Gantrisin	61	56	74	68	57	64	10	12
Furadantin	....	67	....	85	....	80	....	75

In 1956 P. vulgaris and P. rettgeri were significantly more sensitive to Streptomycin than in 1955. Our most important finding, however, was the effectiveness of *Furadantin* on all the Proteus types.

Sulphadiazine and gantrisin have proved quite effective on the proteus species apart from P. rettgeri which showed a high resistance to most chemotherapeutics. Chloramphenicol and furadantin gave the highest activity on all proteus strains and this result can be a guide in their chemotherapy.

Our results on the sensitivity of *coli-aerogenes* strains gave the following results :—

	Per cent.
Streptomycin	75
Chlorotetracycline	98
Oxytetracycline	98
Tetracycline	91
Chloramphenicol	98
Polymyxin B	97
Sulphadiazine	60
Gantrisin	55
Furadantin	59

During the year we cultured 109 *B. anitratum* strains and the sensitivity of these strains is as under :—

	Per cent.
Streptomycin	34
Chlorotetracycline	94
Oxytetracycline	95
Tetracycline	73
Chloramphenicol	37
Polymyxin B	92
Erythromycin	85
Sulphadiazine	26
Gantrisin	42
Furadantin	14

The interesting fact is the relative resistance of our strains to streptomycin and chloramphenicol and the high sensitivity to *erythromycin.*

Sensitivity testing was performed on a peptone-free horse-blood-glucose agar plate, but it was observed that a high percentage of the anitratum strains which were resistant to erythromycin on the sensitivity plate were sensitive, if only moderately, on plain agar plates. In contrast to B. anitratum, the enterobacteriaceae are generally resistant to erythromycin and only 3 per cent. of our coli-aerogenes strains were sensitive to it.

Salmonella

From 11 cases (patients and carriers), 17 positive *faeces* and *urine* cultures were obtained.

From the 11 Salmonella cases the following types * were cultured :—

	No. of cases	No. of specimens
S. typhi	4 (3 phage type E 1) (1 phage type C)	10
S. paratyphi A	1	1
S. paratyphi B	1	1
S. typhi murium	2	2
S. morbificans bovis	1	1
S. adelaide	1	1
S. anatum or newington	1	1
Blood cultures : †		
S. typhi	1	2
S. paratyphi B	1	2

S. typhi muriu was cultured twice from guinea-pigs from our animal house.

Moore swabs.—One S. typhi murium strain and one S. derby were cultured from the *Swan River* near Fremantle Harbour.

Egg-pulp.—One strain of each, S. orion, S. poona and S. new brunswick, was detected.

Shigella

From the faeces of nine patients Shigella cultures were obtained. The distribution of the types was as follows :—

Sh. flexneri	3 specimens
Sh. sonnei	4 specimens
Sh. newcastle	2 specimens

Blood Cultures

Our blood culture equipment with double medium (which will be described in a publication) and Liquoid tube was very helpful in detecting the infective agents and minimised the risk of contamination.

The following species were cultured :—

	No. of Cases	No. of Specimens
Staphylococcus aureus	13	30
Staphylococcus albus	1	2 (p.m. confirmed)
B. coli	4	7
Klebsiella friedlaenderi	2	2
Enterococcus	1	6
Streptococcus viridans	1	2
B. anitratum	1	1
S. typhi	1	2
S. paratyphi B.	1	2
	25	54

It will be seen that the majority of the cases were staphylococcal bacteraemias and, apart from the six due to B. coli and klebsiella infections, there were only sporadic cases caused by the remaining species.

The bacteraemia caused by *staphylococcus albus*, haemolyticus, coagulase negative should be specially noted as cases of endocarditis due to this type are relatively rare and there is a natural tendency to regard a staphylococcus albus strain in a blood culture as a contaminant. In our case, the strain was cultured on two separate occasions from the blood and a staphylococcus albus strain with identical sensitivity was also cultured from the mitral valve at the post-mortem.

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* For the serological differentiation of the Salmonella strains we are indebted to Dr. Nancy Atkinson, Head of the Salmonella Reference Laboratories, Adelaide, and for the phage typing of the S. typhi strains to Dr. M. M. Wilson, Assistant Director, Public Health Laboratories, Melbourne.

† See also under " Blood Cultures " below.

Cerebrospinal Fluid

The distribution of the acute bacterial meningitis was, as under :

	No. of Cases	No. of Specimens
Diplococcus pneumoniae	4	4
Haemophilus influenzae	2	2
Enterococcus	1	1
Klebsiella friedlaenderi....	1	8
Neisseria meningitidis	1	1

Owing to the vastness of Western Australia, there is the difficulty in an early reporting of bacteriological and cytological results in meningitis.

In spite of the fact that specimens are sent by the quickest possible route, (*i.e.* express, or air mail) it very often takes 24 hours or longer before the specimen reaches the laboratory. During this time not only do some of the bacteria lose their viability, but there is always a certain degree of cytolysis of the leucocytes present. Through this cytolysis our report may be misleading. Therefore, we report all C. S. F. examinations which arrive later than six hours after the specimen was taken, with the remark, " Leucocyte count may be inaccurate due to autolysis during transport." We are engaged in experiments to control cytolysis during transport. A similar procedure is the method of taking the specimen in NaF to prevent glycolysis.

Diphtheria.

In 1956 from 3,487 cases (patients and carriers), 5,486 specimens were examined for C. diphtheriae.

After a series of experiments with the different *enrichment media* in the second half of the year, a simple modification of the Schroer fluid medium was introduced. The results gained with this enrichment medium, compared with Loeffler slope and tellurite plate can be seen in Table 4.

Table 4

Diphtheriae Statistics, since the introduction of Schroer Enrichment Medium.

	No.	Percentage
Number of examinations using Loeffler, tellurite plate and Schroer enrichment medium	2,552	
Number of positive examinations	104	4·08
Positive on Loeffler, tellurite plate and Schroer enrichment medium	18	17·3
Positive on Loeffler and tellurite, negative Schroer	*Nil*	....
Positive on Loeffler and Schroer, negative tellurite	1	0·96
Positive on tellurite and Schroer, negative Loeffler	36*	34·7
Positive on Loeffler, negative tellurite and Schroer	3	2·8
Positive on tellurite, negative Loeffler and Schroer	2	1·9
Positive on Schroer, negative Loeffler and tellurite	44	42·3

* Included in this figure are two strains which were positive on Schroer only after 48 hours incubation.

The above table shows that 95·3 per cent. of the cultures were positive on Schroer medium as against 53·9 per cent. tellurite plate and 21·1 per cent. on Loeffler slope. The very high positive rate on the enrichment medium is indubitable, but the advantage of the medium is limited because the diagnosis can only be made from the subculture on to solid media. We are using Loeffler slopes at present for this purpose. The sub-culture needs at least eight hours' incubation, therefore in the majority of the cases the diagnosis is delayed by one day. But the advantage of the enrichment medium is evident, especially in treated cases where, through antitoxin and penicillin treatment, the growth on solid media may be negative. The fluid medium is also very useful for detecting post-diphtheric carriers before these are discharged from hospital. A promising field for the use of enrichment medium is its employment as a *transport medium*, especially for carrier surveys.

An analysis of typing and virulence tests of strains isolated from September to December, 1956, can be seen below :—

Table 5

Number of positive strains	49	
Number of virulent strains	42	85·7%
Typing of virulent strains—		
Type Gravis	3	7·3%
Mitis	38	90·4%
Intermedius	1	2·4%
Number of avirulent strains	7	14·3%
Typing of avirulent strains—		
Type Gravis	*Nil*	
Mitis	5	71·4%
Intermedius	*Nil*	
Intermediate Gravis-Mitis	2	28·6%

M. tuberculosis and M. leprae

" It is a well known fact that the demonstration of unmistakable tubercle bacilli furnishes the most important criterion we have in the diagnosis of tuberculosis. Twenty-five years ago no one would seriously have questioned the reliability of a diagnosis based upon the discovery of acid-fast bacilli in a properly stained sputum smear. In recent years the knowledge that other acid-fast organisms may be present in the sputum has made necessary the employment of more sensitive methods for demonstrating true tubercle bacilli *i.e.* culture and guinea pig inoculation." (W. Steenken, Director of Trudeau Laboratory).

Keeping this in mind, each strain of M. tuberculosis was diagnosed on the basis of its colonial and microscopical morphology, the neutral red test and cord formation, in accordance with Yegian's and Kurung's findings, in Dubos medium containing 0·05 per cent. Tween 80, 0·5 per cent. bovine albumin and 5 per cent. human serum.

The blood medium, which was introduced by us last year proved a most valuable medium for the early detection of M. tuberculosis. Using Dubos base (without Tween 80) and citrated human blood the medium showed up clearly the characteristic colonial morphology.

The blood medium has, according to our observations, the following advantage over the Loewenstein-Jensen medium :—(a) a higher percentage rate of positives ; (b) a quicker growth rate ; (c) a more typical colonial morphology. In 1956 the blood medium gave 7 per cent. positive cultures against 6 per cent. on Loewenstein medium. This means an increase of 17 per cent. Besides the solid media Besredka and Kirschner fluid media (the last with the addition of agar according to Knox) were used.

The volume and distribution of work in the Tuberculosis Laboratories can be seen in Table 6.

The analysis of the positive culture and guinea pig inoculation is illustrated in Table 7.

Table 6

Analysis of Examinations for 1956

Specimens	Direct Smears			Centrifuged Dep.			Cultures			Animal inoculation			Total
	R.P.H.	D.P.H.	Total	R.P.H.	D.P.H.	Total	R.P.H.	D.P.H.	Total	R.P.H.	D.P.H.	Total	
Sputum	634	1,363	1,997	251	621	872	252	623	875	49	143	192	3,936
Gastric Cont.	....	....	....	5	37	42	102	689	791	85	712	797	1,630
Urines	....	....	....	215	59	274	225	67	292	90	35	125	691
Pleural fluid	....	....	....	27	11	38	27	11	38	27	13	40	116
C.S.F.	....	....	....	59	11	70	58	11	69	58	11	69	208
Other specimens	18	7	25	51	26	77	51	31	82	54	28	82	266
Total	652	1,370	2,022	608	765	1,375	715	1,432	2,147	363	942	1,305	6,847

Table 7

Analysis of positive specimens

Specimens	Total No. of specimens cultured	Positive cultures		Positive guinea pigs		Total No. of positive specimens		Analysis of 215 positive specimens							
								Culture positive guinea pig positive		Culture positive guinea pig negative		Culture negative guinea pig positive		Culture positive guinea pig not inoculated	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Sputum	875	62	7	57	6·5	63	7·2	56	26	1	0·5	1	0·5	5	2·2
Gastric contents	791	110	13·9	123	15·6	126	15·9	107	49·7	3	1·3	16	7·5	....	....
Urine	292	10	3·4	9	3·1	10	3·4	9	4·2	....	....	....	....	1	0·5
Pleural fluid	38	1	2·6	1	2·6	1	2·6	1	0·5	....	....	....	....	....	....
C.S.F.	69	1	1·4	2	2·9	2	2·9	1	0·5	....	....	1	0·5	....	....
Other specimens	82	11	13·4	13	1·6	13	1·6	11	5·1	....	....	2	1·0	....	....
Total	2,147	195	9·0	205	9·5	215	10·0	185	86·0	4	1·9	20	9·3	6	2·8

We were not greatly troubled during the year by acid-fast saprophytes. These were found in sputum : 0·7 per cent. ; in gastric contents : 1·1 per cent., and in urine : 0·4 per cent.

While working in Loewenstein's laboratory we found that 6 tubes (eventually 4) of media gave the optimum results in the culture of M. tuberculosis. Brief statistics from our present material show that from 142 positive specimens, when using 2 Loewenstein-Jensen and 2 blood media, 22 specimens (15 per cent.) were positive in *one* tube only and 24 specimens (17 per cent.) were positive in *two* tubes only. The results stress the importance of using several tubes in the cultural diagnosis of M. tuberculosis.

An amount of experimental work was done to devise a *haemoglobin* medium which could be heat sterilised and which could replace the blood medium. Through the work entailed by the equipping of the new laboratories these experiments, which showed very interesting results, could not be finalised.

An important observation was that on *Tryptose agar* (Difco) many of the M. tuberculosis strains showed a light growth in the first subculture. These unexpected results prompted us to incorporate Tryptose agar in a blood base. Experiments with this medium are in progress.

The *new Tuberculosis laboratories* situated in the premises of the Chest Clinic were opened early in August. These laboratories incorporate all the features and apparatus necessary to facilitate tuberculosis work. Besides the spacious and well-equipped laboratories, an animal house with all its necessary accompaniments (inoculation, post-mortem, disinfection rooms, incinerator room and store room) and a self-contained office are provided.

Conjunctivitis

In several cases of acute conjunctivitis in children *Haemophilus sp.* were cultured. From the characteristics of the strains they appeared to be Koch-Weeks' bacilli.

Organisation of Despatch and Reporting of Specimens from country areas

The following circular was sent to all Medical Practitioners :—

" Owing to the time required for the transport of specimens from country areas, there is necessarily a delay in their examination and reporting.

" It has therefore been arranged that special attention should be given to these specimens, and generally in all urgent cases the bacteriological and sensitivity reports should reach the doctors in 24 to 48 hours' time after their arrival in the Public Health Laboratories.

" All *urgent* bacteriological requests should therefore be clearly marked—preferably with red ink or pencil at the top of the request form : ' Sensitivity Test Urgent ' or in exceptional cases where no sensitivity is required : ' Urgent.' The specimens so marked will be especially handled and the report will be issued as soon as possible by Telephone or Telegram.

" The country doctors are reminded of the following postal regulation and arrangements when sending specimens :

> ' Specimens—especially C.S.F.'s—should be despatched as soon as possible after being taken and to ensure a delivery immediately on arrival in Perth they should be sent " Express Delivery." Arrangements have been made with the General Post Office, that these packets will be delivered by special messenger. " Express Delivery " labels are available on request from these laboratories.
>
> ' The work of the laboratories is also facilitated if advice is sent by *telegram* of the despatch of a specimen. The type of specimen, examination required, and the route by which it is being despatched should be given.' "

Stuart's Transport Medium

Because of the necessary delay in examination of specimens due to great distances in Western Australia, we experimented with Stuart's transport medium as a means of preserving specimens of H. influenzae and H. pertussis during the journey. The results were most gratifying and specimens taken in this medium gave a much higher positive rate than those sent on serum swabs.

Miscellaneous

Extensive work was started on antibiotic combinations to give the clinician more guidance for their treatment than is obtainable from the simple antibiotic tests. On account of the transfer to, and the division of, the new laboratories, this work which was very promising had to be temporarily interrupted.

Serological Section

Mr. A. F. Drummond, Technical Officer, gives the following account of the work in this section. A statement of work done is below : -

Table 8

	R.P.H.	Public Health	Total
Serology—			
Wassermann Reactions	981	4,759	5,740
Kahn Tests	834	4,144	4,978
Cardiolipin Tests	938	4,181	5,119
Gonococcal Complement Fixation Tests	147	873	1,020
Hydatid Complement Fixation Tests	16	16	32
Widal Reactions	480	678	1,158
Weil-Felix Reactions	160	226	386
Abortus Agglutinations	160	235	395
Antiglobulin Test for Brucellosis	19	42	61
Ricksettsial Agglutination and C.F.T.	6	7	13
Anti-Streptolysin O Titre Estimation	91	39	130
Cold Agglutinins	15	....	15
Paul Bunnell Tests	126	63	189
Precipitin Tests	....	6	6
Rose and Ball Tests	124	146	270
S. typhi Vi	....	9	9
Miscellaneous	2	3	5
Medico Legal Examinations—			
Chemical Tests for Blood	....	48	48
Serological Tests for Blood	....	13	13
Precipitin Tests for Blood	....	12	12
Semen examination—(a) chemical	....	38	38
(b) micro	....	42	42
Hormone Tests—			
Toad Tests (Qualitative)	384	1,292	1,676
Toad Tests (Quantitative)	20	18	38
Friedman Tests	....	7	7
Aschheim Zondek Tests (Qualitative)	....	....	....
Aschheim Zondek Test (Quantitative)	1	....	1
	4,504	16,897	21,401

Wassermann Reaction

Correlation between Wassermann Reactions (employing Difco Kolmer Improved Antigen), VDRL tube flocculation tests and Kahn Tests, continues to be good.

Toad Tests for Pregnancy

Bufo marinus male toads from Queensland are used. Two toads are injected with each specimen.

In 22 cases, discrepant results were obtained between duplicate toads.

This is considered to be due to either :—

(a) Low concentration of hormone in the specimen ;

(b) non-reacting toad ;

(c) faulty inoculation.

In 11 of the 22 cases, a further test on the same specimen of urine eliminated the discrepancy.

One non-reacting toad, examined post-mortem, showed undeveloped testes.

Two others showed extensive muscular damage and haemorrhage, indicating that the injection had been made into muscle instead of the dorsal lymph spaces, as intended. A fourth showed no macroscopic abnormality, and no reason could be offered for its failure to respond to the usual injection of " positive " urine.

Rose and Ball Tests.

A number of sera are being tested by three different techniques of sheep-cell haemagglutination tests for rheumatoid arthritis, in an attempt to ascertain their sensitivity and specificity.

Accommodation

The new Serology Laboratory and its new equipment have proved highly satisfactory during 13 months' occupation.

Publication

N. Kovacs. "Identification of *Pseudomonas pyocyanea* by the Oxidase Reaction." Nature, Vol. 178, p. 703, Sept. 29, 1956.

Acknowledgements

In the administration of the laboratories and in solving of technical problems, the expert handling by the Technical Officer, Mr. A. F. Drummond, was most helpful. This year Mr. Drummond also carried out the majority of the Medico-Legal examinations besides his functions in the Serological Section.

In conclusion I would like to thank the staff for their co-operation and interest in the work.

NICHOLAS KOVACS, M.D.(Vienna), M.R.C.P.A.,
Bacteriologist.

Appendix III.

REPORT FROM THE DIRECTOR, TUBERCULOSIS CONTROL BRANCH TO THE COMMISSIONER OF PUBLIC HEALTH

I have the honour to report on activities for the year ended 31st December, 1956.

For ease of comparison the report is submitted in a form standard with previous years :—

(1) Records and Statistics.
(2) Prevention.
(3) Case Finding.
(4) Medical Care and Isolation.
(5) Social and Economic Protection of Sufferers.
(6) After-Care and Rehabilitation.
(7) Developments.
(8) Conclusion.

(1) RECORDS AND STATISTICS.

STATISTICAL TABLE.

Year.	Mean Population 1,000s.	Notifications.			Number on Register.			Prevalence per 100,000.		Number Receiving T.B. Allowance.	Deaths.			Death Rate per 100,000.	
		Pulm.	Non-Pulm.	Total.	Pulm.	Non. Pulm.	Total.	Pulm.	All Forms.		Pulm.	Non-Pulm.	Total.	Pulm.	All Forms.
1950	558	586	18	604	2,100	....	....	376	....	515	125	3	128	22·4	22·9
1951	580	467	37	504	2,402	75	2,477	413	426	474	76	6	82	13·1	14·1
1952	601	508	49	557	2,574	94	2,668	428	444	396	75	7	82	12·5	13·6
1953	621	378	34	412	2,762	120	2,882	445	464	361	43	3	46	6·9	7·4
1954	640	348	34	382	2,769	97	2,866	432	447	326	57	4	61	8·9	9·5
1955	659	413	39	452	2,965	128	3,093	450	469	330	31	2	33	4·7	5·0
1956	677	424	44	468	2,900	146	3,046	428	457	264	43	3	46	6·3	6·8

The annual mortality rate for tuberculosis in all forms has risen slightly to 6·8 per 100,000 of the population, and for pulmonary tuberculosis alone to 6·3.

As a result of successful modern methods of treatment of tuberculosis, when this disease is controlled, multiple pathology is often more evident. Unless death certificates are correctly notated, there is some risk of tuberculosis deaths being loaded by deaths due to other causes. The analysis of deaths in the following report by the Superintendent of Wooroloo Sanatorium is informative in this regard.

There were 468 notifications during the year, of whom 424 were pulmonary, and 44 non-pulmonary.

The slight increase of notifications merely reflects increased compulsory X-ray coverage.

Of the 424 notifications of pulmonary disease, 289 were males, and 135 were females. The graph of age incidence shows even more clearly the spread of cases in males over the 40–80 age groups, whereas in females the peak is still at the 30–34 age group.

The Tuberculosis Case Register remains at much the same level but indicates a slight rise in extra-pulmonary disease ; the prevalence of pulmonary tuberculosis being 428 per 100,000, and 457 for tuberculosis of all forms.

Of the 2,900 registered pulmonary cases, 433 are noted as new arrivals since 1948, of whom 110 are British born and 323 foreign ; the period of supervision of migrants arriving since 1948 has allowed of successful removal of quite an appreciable number of those cases who loaded the register in the earlier post-war period.

A total of 539 persons were removed during the year, 292 as follow-up unnecessary (*i.e.*, completely controlled or cured), 74 transfers out of the State, 20 revised diagnosis, 135 deaths due to tuberculosis and other causes, and 18 untraceable.

Of the 2,788 cases of pulmonary disease classified as to stage of activity, 592 were classified as " active," 1,305 as " arrested " and 891 as " inactive."

Of 2,846 cases of pulmonary disease classified as to extent of disease, 800 were classified as " Minimal," 1,559 as " Moderately advanced " and 487 as " Advanced."

Due to the impossibility of keeping the register on a daily up-to-date basis, in these days of rapid results of treatment, these classifications can only give an approximate indication of trends of the disease pattern.

As at 31st December, 1956, a total of 264 individuals were in receipt of the Tuberculosis Allowance, of whom 207 were males and 57 females ; a decided drop on the previous year, and a reflection of decreased infectivity.

During the year, 131,410 35 and 70 mm. micro films were taken, of which 101,860 were taken in the metropolitan area and 29,550 in the country.

The total number of micro films taken by the Tuberculosis Control Branch since 1948 is now 587,221. This figure excludes all routine micro films taken in hospitals. It is estimated that 80 per cent. of the State has now been covered by compulsory surveys.

A total of 12,507 large films were taken during the year at the Perth Chest Clinic bringing the total since the Clinic opened to 95,227.

An interesting epidemiological study was carried out during the year with a Mantoux test survey of schoolchildren in the same State primary schools where this had been previously carried out in 1949.

The marked drop in reactors as shown in the following tables is a very encouraging indication that children are not now being exposed to the same extent to infection with the Mycobacterium tuberculosis.

The reactors in the 12–13 year old group during 1956, of course, comprise those of the 6–7 year old group in 1949.

There was also an increase of the average percentage of reactors 10·5 per cent. in New Australian children but as the number tested, 163, is a small fraction of the total number tested, it does not affect the interpretation of the results.

Table 1.

MANTOUX SURVEY.

Schoolchildren, Perth Metropolitan Area.

Age (Years).	1949.			1956.		
	Number of Subjects.	Number of Reactors.	Percentage of Reactors.	Number of Subjects.	Number of Reactors.	Percentage of Reactors.
6 to 7	149	27	18	146	3	2
7 to 8	139	30	22	157	5	3
8 to 9	138	43	31	241	3	1
9 to 10	154	46	30	372	11	3
10 to 11	190	76	40	303	11	4
11 to 12	201	76	38	318	25	8
12 to 13	391	199	51	688	111	16
Total	1,362	497	....	2,225	169	....
Average percentage of Reactors	....	....	32·8	....	....	5·3

(2) PREVENTION.

The Senior Visiting Nurse reports an increase in the number of patients visited in the metroplitan area to 1,924, the increase reflecting metropolitan case finding activities, and 5,591 visits were paid to these patients by the visiting nurses. There were only 15 patients with positive sputum living under approved conditions.

The visiting nurse at Kalgoorlie had 151 patients under her supervision.

It has been impossible to cross record X-ray examination of contacts due to overlap with mass surveys, and only 844 are noted as such. It was decided to cease posting contact circular notices and the responsibility of contact follow-up has once again been placed directly in the hands of the visiting nurses.

Attention was again paid to improving housing conditions where indicated, and after representation by the Tuberculosis Physician, 28 houses were made available by the State Housing Commission in the metropolitan area.

B.C.G. Vaccination.

There has been no general extension of the use of this vaccine, vaccination being again restricted to negative reactors amongst National Service Trainees, contacts of known cases and girls of the school leaving age groups. A total of 9,096 Mantoux tests were performed and 1,448 were vaccinated in the metropolitan area—this figure excludes tests and vaccinations carried out at major hospitals.

A six year follow up Mantoux survey and B.C.G. programme was carried out by Clinic medical officers on aborigines in the Kimberley and North-West Divisions.* A total of 3,542 natives were tested and 2,288 negative reactors vaccinated.

As in the 1950 survey, and shown in the following tables, the Mantoux conversion rate was markedly low in the more isolated groups of natives.

Amongst those vaccinated six years previously 51 per cent. were found to be still positive reactors.

A marked fall in the conversion rate in the unvaccinated younger native groups (including those born since the 1950 Survey) may be attributed to improved case finding amongst the white and native population in the area studied and to the vaccination of negative reactors with B.C.G.

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* "Six Year Follow-up Mantoux Survey of Aborigines in Western Australia."—F. G. B. Edwards, K. W. H. Harris, S. E. Slade: Accepted for Publication—M.J. of Australia.

Table 2.

TABLE SHOWING THE MANTOUX STATE IN 1956 SURVEY IN NATIVES NOT PREVIOUSLY VACCINATED.

Age Group.	+ ve.	— ve.	Total.	Percentage + ve.
0 to 5	23	547	570	4
6 to 10	32	259	291	11
11 to 15	60	128	188	32
16 to 20	86	129	215	40
21 to 25	80	133	213	38
26 to 30	120	156	276	43
31 to 35	88	85	173	51
36 to 40	121	106	227	53
41 and over	388	495	883	44
Total	....	....	3,036	34·1

Table 3.

TABLE SHOWING MANTOUX STATE IN 1950 SURVEY.

Age Group.	+ ve.	— ve.	Total.	Percentage + ve.
0 to 5	34	256	290	11
6 to 10	66	242	308	21
11 to 15	101	144	245	41
16 to 20	134	100	234	57
21 to 25	96	106	202	47
26 to 30	152	94	246	61
31 to 35	79	56	135	58
36 to 40	74	64	138	53
41 and over	455	404	859	53
Total	....	....	2,657	44·8

Table 4.

TABLE SHOWING MANTOUX STATE IN 1956 AMONGST NATIVES VACCINATED IN 1950.

Age Group.	+ ve.	— ve.	Total.	Percentage + ve.
6 to 10	50	82	132	38
11 to 15	49	45	94	52
16 to 20	36	33	69	52
21 to 25	30	18	48	62
26 to 30	34	24	58	59
31 to 35	15	18	33	45
36 to 40	14	10	24	58
41 and over	30	20	50	60
Total	....	....	508	51

Table 5.

TABLE SHOWING OVERALL INCIDENCE OF NATURAL CONVERSION AMONG ISOLATED NATIVE COMMUNITIES (1956).

	Unvaccinated Natives.	Percentage + ve.
Jigalong	88	12
Pallotine	79	13
Billiluna	40	7
Total	207	15·5

" *Morriston* " *Preventorium.*

The demand for admissions of babies and infants from tuberculosis mothers was slightly lower this year, there were only 36 admissions but the daily average state was 11.

Action under Sections 293 *and* 294 *of the Health Act.*

Thirty-six persons were required " to submit to X-Ray examination of the chest for tuberculosis," including persons who did not report for large film examination after discovery of an abnormality in micro films during mass surveys, and patients on the Case Register where supervision was necessary.

The value of this action is shown by the fact that three persons subsequently entered hospital voluntarily, two were diagnosed as tuberculous and received out-patient treatment, and 22 persons resumed out-patient attendance.

Three persons suffering from tuberculosis in a communicable state " not conducting themselves to preclude infection to other persons " were directed to enter Wooroloo Sanatorium. Two of them subsequently did so, and one left the State.

One person was fined £5 with £3 7s. costs in Perth Police Court on 2nd of February, 1956, for failing to attend for compulsory chest X-Ray examination.

(3) CASE FINDING.

(i) *Mass Radiography.*

Compulsory mass surveys continued during the year covering the City of Perth, including the suburbs of West Perth, North Perth, Leederville, Floreat Park, Mount Hawthorn, Victoria Park and Carlisle; and the Road Board Districts of Melville, Belmont, Canning and Gosnells. In addition, an extensive coverage was made of country districts, including the Municipalities of Narrogin, Wagin, Carnarvon, Kalgoorlie and Boulder, and the Road Boards of Toodyay, Katanning, Narrogin, Wagin, Kojonup, Williams, Moora, Swan, Tammin, Nungarin, Southern Cross, Kalgoorlie, Coolgardie, Norseman, Esperance and Westonia.

It is interesting to note that in this State the incidence of significant pulmonary tuberculosis in compulsory surveys show little difference between rural and urban areas. Of 62,053 persons over 16 examined in the metropolitan area, 97 or 1·5 per 1,000 were notified as suffering from pulmonary tuberculosis, whereas of 30,177 examined in the country, 50 or 1·6 per 1,000 were notified. This latter figure was not loaded by the results of the survey of the goldfields population of Kalgoorlie and Boulder ; the incidence from the 9,300 persons examined there being the same, 15 cases from 9,300, *i.e.*, 1·6 per 1,000 ; although eight of these cases were of silico-tuberculosis.

The results of the latter survey of the goldfields were particularly gratifying compared with the previous survey conducted in 1952 when an incidence of approximately four per 1,000 was noted. However, the follow-up of this survey done towards the end of the year is not yet complete. There are a further 12 suspects being observed, and other findings were : four persons suffering from carcinoma of the lung (all inoperable), five examples of pneumonia (including resolving pneumonia), and seven diagnosed as chronic inflammatory conditions, including bronchiectasis.

(ii) *Patients referred by Medical Practitioners.*

(a) *Metropolitan Area.*

The number 3,412 referred by practitioners in the metropolitan area is very disappointing—and less than half the number referred in 1952 and 1953.

It appears that general practitioners are relying on mass surveys to discover tuberculosis, or are just not finding suspect chest patients in their practice. The incidence of significant tuberculosis in this group is three in four hundred ; less than previous years, but still shows the importance of examining " chest suspects " as a case finding measure.

(b) *Country Areas.*

In contradistinction to metropolitan practitioners, country practitioners are increasingly using the consultative service offered by the Perth Chest Clinic, and 8,605 large films were referred for opinion, being 1,287 more than the previous year. Films were received from the same 58 centres enumerated in last year's report.

Twenty-one cases of pulmonary tuberculosis, or 2·4 per 1,000 were notified as a result and a further 105 were labelled as suspects for further observation ; apart from 23 cases of pulmonary carcinoma and 831 other conditions reported on.

Dr. J. R. Hankey was appointed part-time Tuberculosis Officer at Collie in place of Dr. A. Walsh, who left that town and whose services are gratefully acknowledged, otherwise the officers at Albany, Bunbury, Geraldton, Northam, Merredin and Kalgoorlie, namely, Dr. A. E. Vivian, Dr. W. Lawson Smith, Dr. A. J. Beaumont, Dr. A. McL. Robinson, Dr. W. J. Grey and Dr. Allen B. Webster, respectively, continue to assist the Department at these centres. The enthusiastic services of Dr. A. Jacobs, of Narrogin, are also gratefully acknowledged.

(iii) *Hospital In-Patient and Out-Patient Group.*

Only 3,405 35 mm. routine micro films of in and out patients at the Royal Perth Hospital were taken during the year. These films were read in conjunction with Dr. R. R. Anderson, the Medical Superintendent, but only two patients were notified as tuberculosis sufferers, only one of whom required admission to the Sanatorium.

At Fremantle Hospital some 60 per cent. of admissions were examined on 2,752 large films ; and 578 35 mm. films of both types of patients were also taken. Four active cases of pulmonary tuberculosis were discovered as a result, and one of pleural effusion.

Three thousand and thirty-seven routine 35 mm. films were taken at the St. John of God Hospital, Subiaco. Only one patient was discovered suffering from pulmonary tuberculosis, but he was in such an advanced infectious condition that it justified the year's work, and the enthusiasm and thoroughness of the Sisters of the X-ray Department of this hospital is gratefully acknowledged.

One thousand nine hundred and twenty-three routine ante-natal chest X-ray examinations were carried out during the year at the King Edward Memorial Hospital and although some important non-tuberculosis conditions were found, no significant pulmonary tuberculosis was discovered.

It is pleasing that the return of cases found in this group is now small, but I do not think that this work should be relaxed.

(iv) *Migrants.*

An attempt has again been made to evaluate the prevalence of pulmonary tuberculosis. Although the data available is not complete, by comparison with findings of earlier years, it would appear that the work of the Commonwealth Immigration Department abroad is effective, and there is no undue prevalence.

From figures supplied by that Department, 16,031 persons arrived in Western Australia during 1956, comprising 8,162 British full fare paying passengers, including returning Australians, 2,385 assisted British migrants and 5,484 aliens.

A total of 4,549 predominantly large films was submitted by the Commonwealth Health Department for re-check ; the technique of the majority of the European films was satisfactory, but some from countries of the Middle and Far East were unsatisfactory. Only one notification resulted this year from re-reading (a person from Peking).

There were 55 notifications during the year from migrants arriving since 1948, which is not an undue proportion, as it is estimated 152,541 of the present population (677,000 as at 31st December, 1956) have arrived since that date. Eight of the 55 were British full fare paying, and seven assisted British. Forty were aliens, of whom nine had been under observation for from one to six years. Thirty-one had been passed on arrival, and had developed tuberculosis since arrival.

There were nine notifications of migrants who arrived in 1956, consisting of three British seamen, four British assisted, and two aliens (one Dutch and one Russian) and all were admitted to Wooroloo Sanatorium.

(4) MEDICAL CARE AND ISOLATION.

As mentioned in Dr. Elphick's following report, there is nothing new to report in medical or surgical treatment, although several new anti-tuberculous drugs have been developed they have not lived up to expectations ; and our armamentarium continues to be combinations of the three drugs—Streptomycin, Isoniazid and P.A.S. Very few sufferers do not benefit from treatment with these drugs and quick control of the disease process is achieved in the great majority of patients.

Thoracic surgical technique is now as safe as abdominal, and segmental resection of residual disease process enables a more absolute control of the pulmonary tuberculosis process, with less risk of future relapse. Relapse of disease, however, still remains a problem, although as reported by Dr. Elphick, Wooroloo Superintendent, it appears the time interval before breakdown occurs is stretching out, no doubt due to the present practice of continuing patients on drug treatment for one or two years after discharge whenever any initial significant disease process was present.

If a similar drug to Isoniazid (easily taken and quickly absorbable) could be discovered to be given in combination with it to prevent emergence of resistant strains of the tubercle bacillus, perhaps we would have as near a perfect answer as possible for the medical treatment of tuberculosis. The natural history of the disease and the pathological process that occurs in the lungs is such that I am afraid it will otherwise always be liable to some relapse, if not caught in time at an early stage of development.

In the appendix to the report from the Wooroloo Sanatorium is included the interesting results from some painstaking research on laboratory media for the culture of tubercle bacilli. This confirms the generally accepted views of the efficacy of the standard Lowenstein-Jensen media as being suitable for the bacilli, and the necessity of using four culture tubes for each specimen.

Repatriation General Hospital, Hollywood.

Twenty female patients were admitted for surgery and treatment to the T.B. beds available for civilians at this hospital.

Royal Perth Hospital.

There were 173 admissions of tuberculosis patients during the year, including 88 from Wooroloo, the majority of the latter for surgery.

There were 13 patients in hospital at the beginning of the year and 12 at the end. During the year there were 132 transfers to Wooroloo ; three to the Repatriation General Hospital, Hollywood ; 36 discharges home and two deaths.

Fremantle Hospital.

There were 21 admissions of tuberculosis patients during the year ; two transfers to Royal Perth Hospital ; one to Repatriation General Hospital, and 15 discharges to home.

Princess Margaret Hospital for Children.

There was a marked increase in the number of children, 21, admitted to this Hospital during the year, the first occasion this has happened since 1953.

The increase was partly due to one family group of half-caste aborigines, three from one family and five from the group, as a result of contact follow-up from the notification of a post-mortem diagnosis of T.B. meningitis in an infant of the family.

The country doctor concerned, Dr. A. M. Clark, of Lake Grace, is to be commended for her clinical acumen and public health conscience, and has set an example of the necessity of not taking things for granted—or just signing a death certificate " Meningitis."

Of the 21 admissions, six were classified as primary tuberculosis (five with radiological pulmonary changes—including one half-caste) ; three had miliary tuberculosis (all half-castes) ; four had tuberculous meningitis (one severe, one moderate, and two early—one of the latter a half-caste ; the three earlier cases recovered rapidly under treatment, stressing the importance of early diagnosis). There were two adult-type pulmonary cases in older children (both migrants from Europe) ; there were six cases of tuberculous cervical adenitis. It is pleasing to record there were no deaths.

Claremont Mental Hospital.

There were no new sufferers discovered during the annual chest X-ray survey of inmates of the above institution. It is satisfactory to note that there were 20 empty beds amongst the 83 available in the Tuberculosis Block. It would appear the problem of infection amongst patients has been overcome.

Out-Patient Clinics.

The appointment " wet film " system again functioned smoothly, with a minimum of delay for patients waiting to see Clinic medical officers, and attendances and clinic average were practically unchanged from 1955 ; this is no doubt due to the approximate balance of new cases discovered as against those removed from the Case Register.

As mentioned by the Tuberculosis Physician, Dr. Heymanson, in his following report, the artificial pneumothorax clinics are not an important aspect of clinic " work " and it will be eliminated completely within a year or so, as patients who have undergone this treatment over the past few years reach the time for the abandonment of their treatment.

The Fremantle Chest Clinic has also reached a level of function, but has more than justified its existence by the fact that 23 cases of pulmonary tuberculosis were diagnosed during the year as a result of its activities, and of whom 21 were admitted to hospital.

The amount of bacteriological investigation referred from the Chest Clinic to the Public Health Laboratories was increased by almost a third on the previous year, due to investigation of suspects from the compulsory surveys as follows :—

		No. of Tests.	Individuals.
1.	Sputum Examinations	1,960	543
	Positive Results for M. tuberculosis	308	79
2.	Gastric Contents (cultures and guinea pigs)	984	214
	Positive Results for M. tuberculosis	276	58

Dental Clinic (*see* also under Section 7).

This new clinic for out-patients handled 26 patients who made 103 visits. The dentist made 22 visits and carried out 43 extractions, 18 fillings and provided 27 dentures.

(5) SOCIAL AND ECONOMIC PROTECTION.

The Tuberculosis Allowance rate remained at the same level as the previous year, namely, £9 12s. 6d. per week for the married sufferer with dependent wife, plus 10s. for each dependent child ; £4 per week for the single sufferer in hospital ; and £6 2s. 6d. per week for the single sufferer undergoing domiciliary treatment. Permissible other income : £7 per week for married male patients and £4 per week for single persons.

There was again a marked drop in the number of persons receiving the Allowance in this State, which may be taken as further evidence of control measures and quicker results from treatment.

As at 31st December, 1956, the 264 patients receiving the Allowance were classified as follows :—

Males .... 207 : Females 57

One hundred and sixty-two were in hospital, and 102 were receiving out-patient treatment :—

Australians 218

Migrants .... 46 comprising Displaced persons, 16 ; English, 12 ; European, 15 ; Anglo-Indian, 2 ; and Indonesian, 1.

(6) AFTER-CARE AND REHABILITATION.

The rehabilitiation procedures commenced in the Sanatorium and detailed in Dr. Elphick's report, are further supervised on discharge by Dr. Heymanson working in conjunction with Dr. Tomlinson, the Senior Medical Officer of the Department of Social Services. Thirty-four ex-patients were placed in employment after suitable training during the 12 months period.

A number of other clinic patients are referred directly to the Physically Handicapped Section of the Commonwealth Employment Service.

Dr. Heymanson now also acts as medical adviser for the placement and supervision of patients employed by the Tuberculosis Association of Western Australia in the sheltered workshop—the Federal Box Factory run by this Association in Perth. He reports nine patients in employment at the beginning of the year, 19 new employees during the year, with 10 remaining employed at 31st December, 1956.

In spite of all efforts, and no doubt due to the general employment position in the State, there has been some difficulty in placement of men in the older age groups in employment, particularly when they are in the " unskilled " category. Without the assistance of the Tuberculosis Association at Linley Valley and the Box Factory, many ex-patients would not have the opportunity to attempt to regain a position as a useful member of society.

(7) DEVELOPMENTS.

The installation of new equipment for the Tuberculosis Laboratory in the new section of the Perth Chest Clinic was completed, and transfer from the Public Health Laboratory in the Royal Perth Hospital effected by the 31st of July.

The new laboratory is spacious and well equippped, and the new situation should allow of close collaboration of clinic medical staff and bacteriologists, and should eliminate previous difficulties and doubtful diagnoses. The appointment of a new senior laboratory technician, Mr. J. M. Foley, augers well for the future of this laboratory.

A new development was also the commencement of operation of the special dental clinic at the Perth Chest Clinic on the 14th of February. This clinic is staffed by Mr. A. Gallagher, of the Perth Dental Clinic, and is restricted to infectious and potentially infectious tuberculous patients, patients in receipt of the Tuberculosis Allowance ; and often allows of completion of dental work commenced in the Sanatorium. Private practitioners may use this dental surgery for tuberculosis patients if they wish.

The construction of the Perth Chest Hospital proceeds apace, and gives every indication of a modern hospital being available for tuberculosis sufferers by the end of 1957. Considerable time has been spent during the year with Mr. S. Cann, Senior Architect of the Architectural division of the Public Works Department, in discussion of practical details met with during the construction of the hospital.

(8) CONCLUSION.

There is nothing evident as a result of the years work, that suggests any modification is yet possible from the full scale attack on tuberculosis on a national scale.

The key is at present case finding which does not yet indicate any marked falling off of the new cases discovered when community wide compulsory chest X-Ray surveys are carried out ; in spite of the fact that there has been a lessening of return of patients found amongst the previously described " priority " groups, hospital in-patients, out-patients, and suspect chest patients amongst patients attending general practitioners.

All indications from special epidemiological surveys, and from the stage at which disease is discovered, suggest there is a marked lowering of the level of infectivity in the community.

This has been brought about undoubtedly by case finding and discovery of infectious sufferers, particularly with extension of activities of tuberculosis control since 1949, and the more satisfactory results of treatment particularly since the advent of Isoniazid in 1952.

The annual mortality rate of 6·3 per 100,000 of the population for pulmonary tuberculosis may be regarded as satisfactory. The prevalence or morbidity rate has not as yet, however, shown any sign of diminishing, but this must be expected within the next few years.

We have been fortunate over the last few years in building up a Tuberculosis Branch capable of carrying out an effective control programme ; and with the near completion of the Perth Chest Hospital it should be capable of maximum effort.

This development has been possible with the financial aid of the Commonwealth Government, and I would like to here pay tribute to the Commonwealth Director of Tuberculosis, Sir Harry Wunderly, whose advice on his regular visits to this State has been very welcome.

Once again I must acknowledge the full co-operation received from the Repatriation Commission, and especially the valued advice of the Chest Specialist of the Commission, Dr. W. Harris.

In conclusion, I would like to express my thanks to all members of the staff of the Branch, particularly to the sterling support received from Dr. Heymanson, the Tuberculosis Physician, and Dr. Elphick, the Medical Superintendent of Wooroloo Sanatorium, both of whose reports follow.

To you, sir, and the Under-Secretary, Mr. Devereux and his assistants, Mr. H. Smith and Mr. J. Gibson, I express my appreciation of the pleasure in our work.

ALAN KING, B.Sc., M.B., B.S., F.C.C.P.,
Director, Tuberculosis Control Branch.

Appendix IV.

REPORT OF THE TUBERCULOSIS PHYSICIAN.

To the Director,
Tuberculosis Control Branch.

Sir, I have the honour to submit a report for the year ended 31st December, 1956.

PERTH CHEST CLINIC:

Out-Patient Clinics.

These are held on Monday, Wednesday, and Friday mornings each week.

Total attendances	3,658
Average attendance per clinic	25·2
Chest x-rays taken on full size film	12,507

Artificial Pneumothorax Clinics.

Refill Clinics are held on Tuesday mornings and Friday evenings, the latter to accommodate working patients.

Patients attending for refills as at 31 December, 1955		18
Patients attending for refills as at 31 December, 1956		8
Unilateral Artificial Pneumothorax	5	
Pneumoperitoneum	3	
Total screenings		381
Total refills		370

During the year, 10 patients were taken off refills. This form of treatment is now being used less and less frequently, which is reflected in the fact that the number attending for refills has declined in the last few years from approximately 40 to the present figure.

Mass Radiography.

Perth Chest Clinic (Static Unit).

Number of 35 mm. exposures 33,282

Groups x-rayed include the following :

Private patients (routine)	1,202
Armed Services	1,960
Commonwealth and State Public Service Entrants	946
Contacts	854
Immigrants	963
Volunteers	13,669
*Attendances in lieu Metropolitan Survey	6,678
Miscellaneous Groups	4,130
National Service Trainees	2,880

Total number of retakes on full-size film was 673, representing 2 per cent. of the 35 mm. films taken by the Static Unit.

Mobile X-ray Units (Metropolitan and Country).

Number of 35 mm. exposures 91,491

Groups x-rayed include the following :

Armed Services and National Service Trainees	1,626
Teachers Training College	315
University of W.A.	1,288
Claremont Mental Hospital	1,422
Lemnos Hospital	109
Green Place Hospital	26
Heathcote	153
" Sunset " Home	498
Mt. Henry Home	422
City of Perth Survey	30,157
Toodyay Survey	717
Katanning Survey	2,637
Narrogin Survey	2,936

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* These are people who attended Perth Chest Clinic for x-ray during the metropolitan survey instead of the mobile unit operating in their home suburb.

Wagin Survey	1,652
Kojonup Survey	1,502
Williams Survey	749
Moora Survey	1,906
Carnarvon Survey	1,408
Melville Survey	9,651
Swan Survey	2,889
Belmont Survey	6,613
Canning Survey	5,811
Gosnells Survey	3,401
Tammin Survey	435
Nungarin Survey	353
Southern Cross Survey	1,156
Kalgoorlie Survey	6,691
Boulder Survey	2,633
Coolgardie Survey	512
Norseman Survey	1,012
Esperance Survey	710
Westonia Survey	103

Mass Radiography Findings.

Total of persons x-rayed		124,773
Cases of pulmonary tuberculosis notified		158
Admitted to hospital	93	
Under out-patient observation	65	
Suspect cases under out-patient observation		112
Incidence of tuberculosis (notified cases)	0·13%	
Non-tuberculous abnormalities diagnosed (including 21 cases of pulmonary carcinoma)		449

Cases referred for X-ray by Private Practitioners.

Number of patients referred (including 1202 35mm. films and 2210 full-size films)		3,412
Cases of pulmonary tuberculosis notified		26
Admitted to hospital	20	
Under out-patient observation	6	
Suspect cases under out-patient observation		35
Incidence of tubercolosis (notified cases)	0·76%	
Non-tuberculosis abnormalities diagnosed (including 13 cases of pulmonary carcinoma)		551

Mantoux Tests and B.C.G. Inoculation (Perth Metropolitan Area).

National Service Trainees.

Mantoux tests performed			2,468
Positive reactions	1,294		
Negative reactions	1,145		
B.C.G. inoculations		1,085	

Schools.

Mantoux tests performed			5,676
Positive reactions	1,352		
Negative reactions	4,224		
B.C.G. inoculations		Nil	

Contacts.

Mantoux tests performed			1,331
Positive reactions	391		
Negative reactions	864		
B.C.G. inoculations		304	

Miscellaneous (Hospital Staffs etc.).

Mantoux tests performed			221
Positive reactions	134		
Negative reactions	71		
B.C.G. inoculations		59	
Total Mantoux Tests			9,696
Total B.C.G. Inoculations		1,448	

Miscellaneous Groups X-rayed at Perth Chest Clinic.

Applicants for Entry to the Mining Industry.

Total number of applicants		520
Cases of pulmonary tuberculosis notified		3
Admitted to Hospital	2	
Under out-patient observation	1	
Suspect cases under out-patient observation		4
Non-tuberculous conditions diagnosed		71

Applicants for Employment as Hospital Staff.

Total number of applicants	494
Cases of pulmonary tuberculosis notified and admitted to hospital	2
Suspect cases under out-patient observation	1
Non-tuberculous conditions diagnosed	21

Royal Perth Hospital (Routine chest X-ray of new patients).

Patients followed up by this Clinic		18
Cases of pulmonary tuberculosis notified		2
Admitted to hospital	1	
Under out-patient observation	1	
Suspect cases under out-patient observation		4
Non-tuberculous conditions diagnosed		4

FREMANTLE CHEST CLINIC.

Out-Patient Clinics.

Total attendances	514
Average attendance per Clinic	9
Chest X-rays taken on full-size film	2,153

Artificial Pneumothorax Clinic.

Patients attending for refills as at 31st December, 1956	1
Total screenings	56
Total refills	51

Mantoux Testing and B.C.G. Inoculation.

Mantoux tests performed		908
Positive reactions	353	
Negative reactions	555	
B.C.G. Inoculations given		94

Cases referred by Private Practitioners.

Patients referred	260
Cases of pulmonary tuberculosis notified and admitted to hospital	6
Incidence of tuberculosis (notified cases)	2·31%
Non-tuberculous abnormalities diagnosed	50

Mass Radiography.

Total 35 mm. exposures		6,635
Groups X-rayed were as follows :		
Volunteers	5,033	
Armed Services	527	
Merchant Navy	191	
Commonwealth and State Public Service Candidates	93	
King Edward Memorial Hospital patients	84	
Contacts	189	
Migrants	239	
Miscellaneous	279	

Mass Radiography Findings.

Cases of pulmonary tuberculosis notified		23
Admitted to hospital	21	
Under out-patient observation	2	
Suspect cases under out-patient observation		1
Incidence of tuberculosis (notified cases)		0·35%
Non-tuberculous abnormalities		124

F. E. HEYMANSON,
Tuberculosis Physician,
Tuberculosis Control Branch.

Appendix V.

ANNUAL REPORT – WOOROLOO SANATORIUM.

For the Year ending, 31st December, 1956.

The Director,
Tuberculosis Control Branch,
Chest Clinic,
17 Murray Street,
PERTH.

I have the honour to present the Annual Report for the year ending 31st December, 1956.

TREATMENT.

Chemotherapy.

A combination of Streptomycin and Isoniazid was employed as a routine in the initial treatment of all cases. Half a gram of Streptomycin daily was used, except in cases of extensive or acute pneumonic disease, when a daily dose of one gram was considered advisable, together with 300 milligrams of Isoniazid daily—approximately five milligrams per kilogram of body weight. This regime was continued in the absence of reactions for from three to six months, when Streptomycin, one gram three times a week, and P.A.S., 12 grams daily were introduced, Isoniazid being discontinued. This combination continued until the patient received surgery, when daily Streptomycin and Isoniazid were resumed, or until his discharge, when Isoniazid and P.A.S. were used in practically every case as domiciliary treatment.

As a result of this system of treatment, excellent results were obtained as a general rule, the sputum converting rapidly and lesions gradually regressing. The high rate of conversion of sputum is evidenced by the fact that on 31st December, of those patients admitted during the year who had not previously been treated with chemotherapy, and who had been in the Sanatorium for three months or more, one only remained positive on direct examination of the sputum. Of the 160 patients who had been in the Sanatorium for three months or longer on 31st December, there were in fact 16 only with a positive sputum and 15 of these were old patients who had previously had short or long courses of various chemotherapeutic agents together or combined on several occasions during the previous seven to eight years. It would appear indeed that as a result of modern chemotherapy, in practically every new case of tuberculosis we may expect to obtain sputum conversion and it may be anticipated that with prolonged domiciliary chemotherapy following discharge from the Sanatorium, a high percentage of cases of even extensive and advanced disease will be arrested for an indefinite period.

Pyrazinamide.

Eight patients whose disease was deteriorating in spite of combined Streptomycin, Isoniazid and P.S.A. therapy were given a course of Pyrazinamide and Isoniazid, and two others a course of Pryazinamide and Streptomycin, in an effort to control their disease. It has been pointed out by McDermott and others that Pyrazinamide is an effective drug in combination with Isoniazid in patients not previously treated with the latter drug, whereas it is much less effective in combination with Streptomycin or P.A.S., or in combination with Isoniazid in patients previously subjected to Isoniazid therapy, even though their organisms may not show any Isoniazid resistance. Our experience with Pyrazinamide was disappointing and substantiated the findings of other workers that, particularly in the presence of Isoniazid resistant organisms, little benefit can be expected from this drug.

Viomycin.

This drug was used in combination with P.A.S. and Isoniazid in one patient, and a combination of Viomycin and Terramycin was tried in a further patient, but again the results were disappointing and indicated that when patients have ceased to respond satisfactorily to the three conventional chemotherapeutic agents, there is little hope of achieving further improvement from the use of the other antibiotics at present available.

Surgery.

Surgical treatment was as in previous years carried out at Royal Perth Hospital by the thoracic surgical unit of that institution, and we are indebted to Mr. F. J. Clark, Mr. J. A. Simpson and Mr. Peter Gibson for the excellence of the surgical treatment which our patients received. The anaesthetists to the thoracic surgical team, Drs. G. R. Troup and D. C. Wilson contributed largely to their successful surgical manipulations. A feature of the surgical treatment during the year was again the large number of segmental resections carried out, in comparison with collapse procedures, or larger resections. Details of surgical treatment on Sanatorium patients carried out at Royal Perth Hospital are as follows :—

Segmental resections—for tuberculosis	58
for lung abscess	3
Lobectomies (upper)	5
Lobectomy (lower)	1
Apicolyses with plombage (14 patients)	18
Thoracoplasties	4

Corrective thoracoplasty (post lobectomy)	1
Removal of plomb	1
Removal of plomb and throacoplsty	4
Unroofing of empyema	1
Thoracotomy (exporatory)	2

At the Sanatorium a number of minor surgical procedures were carried out as follow :—

Rib resection and drainage of empyema	2
Drainage of extrapleural abscess	1
Pleural aspirations	13
Bronchoscopies	96

In addition to pulmonary surgery, a number of patients treated in the Sanatorium for extra-pulmonary tuberculosis were subjected to surgical treatment at Royal Perth Hospital. Details are as follows :—

Arthrodesis of knee	1
Arthrodesis of shoulder	1
Arthrodesis of elbow	1
Internal fixation of spine	2
Incision and drainage of tuberculous abscess of wrist	1
Nephrectomies	3

Collapse Therapy.

No cases were subjected to artificial pneumothorax treatment during the year, and only two pneumoperiotneums were induced. It would appear clearly established that residual disease, remaining after chemotherapeutic management, is most effectively treated by resection, and when collapse therapy is considered justifiable, apicolysis with plombage provides this more satisfactorily than artificial pneumothorax.

DENTAL SERVICE.

Through the courtesy of the Perth Dental Hospital an excellent dental service was maintained at the Sanatorium during the year, and Mr. K. Wren, as the visiting dentist, has achieved a satisfactory state of dental hygiene in practically all patients.

STAFF.

Medical.

Dr. D. D. Letham was absent on long service and study leave from May until October, and during this period was admitted as a member of the Royal Australasian College of Physicians. Dr. Fisher proceeded on long service and study leave in October, intending to further his studies in tuberculosis and chest diseases in Great Britain and Europe. Dr. P. S. N. Chappell joined the staff in February and has given valuable service during the year. Dr. A. Diamand commenced duty on regional registration at the Sanatorium in December.

Nursing.

Matron Lochhead was on long service and study leave from May until November, and during her absence the nursing staff was under the able guidance of the assistant matron, Miss E. Baker. To Matron and Sister Baker our thanks are due for the continued high standard of efficiency of the nursing staff generally.

Administrative.

Under Mr. J. L. Cross, the administrative staff rendered conscientious service, and I am grateful to them for their co-operation throughout the year.

LABORATORY.

Mr. A. Briedis was transferred to the staff of the Chest Clinic laboratory in May, and his place as senior technician was taken by Mr. E. Diolov, who has maintained a high standard of work throughout the year.

In addition to the routine examination of sputum and other specimens, the laboratory has undertaken research in an effort to establish greater efficiency in concentrating and culturing tubercle bacilli, particularly in gastric contents and laryngeal swabs. Considerable work has been done and a detailed report on the activities of the laboratory is submitted as an appendix to this report. A summary of the routine investigations appears below :—

Sputum Examinations.

Direct smear	2,069
Concentration smears	1,249

Examinations (microscopy, etc.).	
Urine	565
Faeces	40
Pleural fluid	10
Discharges from tuberculosis sinuses, etc.	18
Throat swabs	10
Others	39
Loewenstein Cultures.	
Sputum	3,472
Gastric contents	320
Laryngeal swabs	860
Urine	227
Pleural fluids	23
Discharges (sinuses, tuberculous ulcers, etc.)	21
Faeces	12
Others	15
Guinea Pigs Inoculated	66
Agar Cultures for Secondary Organisms.	
Sputum	115
Urine	166
Discharges	84
Throat swabs	29
Pleural fluids	23
Faeces	34
Others	56
Antibiotic Sensitivity Tests	227
Resistance Tests.	
Stroptomycin	88
Isoniazid	93
P.A.S.	73
Haematological Examinations.	
Haemoglobin estimations	383
Red cell counts	184
White cell counts	321
Differential white cell counts	245
Blood sedimentation rates	89
Haematocrit, Platelet and reticulocyte counts	79
Prothrombin time estimations	107
Biochemical.	
Bromsulphalein excretion tests	46
Sugar tolerance test and blood sugar estimations	102
Test meals	4
Skin Scrapings.	
Hansen's disease	50
Others	53
Postmortem Examinations	13
Culture Media Prepared.	doz.
Loewenstein-Jensen	1,230
Loewenstein antibiotic	30
Charcoal liquid media	30

X-RAY.

The X-ray Department has continued to give good service, despite the further gradual deterioration of plant. The greater place of segmental resection in the treatment of tuberculosis has rendered necessary a marked increase in the number of tomograms taken, and these have occupied a considerable amount of the time of the technician who is to be congratulated on the high standard of tomograms which he has produced. The details of work are as follow :—

X-rays of Chest.

P.A. and lateral	3,769
Tomograms	306
Bronchograms	41
Sinograms	10
X-rays of Spine	110
Extremities	168
Dental x-rays	139
Sinuses and skulls	37
Abdominal	35
Pelvic	27
Barium meals	10
Cholecystograms	6
I.V. Pyelograms	22

In addition 28 E.C.G.'s were taken by the X-ray staff.

REHABILITATION.

Earlier diagnosis due to continued mass radiography, and more effective treatment with chemotherapy and surgery, render more patients fit for return to their old occupations. Nevertheless due consideration must still be given to the rehabilitation of every patient as an individual problem. Fortnightly rehabilitation meetings are still conducted at the Sanatorium and we are indebted to Mr. A. E. Perry, the education and training officer of the Social Services Department, for the interest that he has shown in cases requiring vocational training. On his regular visits Mr. Perry attends the rehabilitation meetings and consults with the Sanatorium rehabilitation officer and medical officers, in considering the requirements of every patient whose previous occupation is considered unsuitable, and a liaison is thus established, to be continued after the patient's discharge from the Sanatorium, when further training is continued as an out-patient. Following are the details of arrangements made for Sanatorium patients in consultation with Mr. Perry :—

Vocational training arranged	30
Patients in training as at 31st December, 1956 (including five who commenced prior to 1956)	35
Interviews regarding future employment	45
Enrolled in migrant English	6
Enquiries on behalf of patient with previous employer, union secretary, etc.	9

Mr. R. Antoine resigned from the position of rehabilitation officer and his place was taken by the Rev. W. A. Kerr, who combines the activities of rehabilitation officer with those of chaplain.

After a long illness, during the remissions of which he served the Sanatorium faithfully and conscientiously as education and rehabilitation officer, Mr. W. J. Skipworth died in August after surgery carried out in an attempt to control his disease which had deteriorated considerably over the past year. His services as education officer, and his help to the many patients who experienced difficulty with their studies, will be sadly missed.

LINLEY VALLEY.

Linley Valley continued to function as a medium of rehabilitation of permanently incapacitated patients. Apart from two ex-patients working fulltime, 10 patients were employed for two, four or six hours per day, and four others terminated their employment to commence full time work in the general labour market. On 31st December, 1956, there were two permanent colonists working for two hours, two for four hours and three for six hours per day. Throughout the year active efforts were made to find more markets for products of the tin smithy, the position of which now would appear to be healthier than at any other time since its commencement in 1951.

The orchard showed a satisfactory profit for the financial year ending 30th June, and considerable work was done in clearing, fencing, and planting clover on the remainder of the property.

OCCUPATIONAL THERAPY.

Miss Elizabeth Adam joined the staff as senior occupational therapist in February, and with her assistant, Miss E. Baines, embarked on a comprehensive scheme for diversional therapy for patients. Miss Baines left the Sanatorium on 5th July, 1956, and to date has not been replaced. The senior occupational therapist, however, has continued to provide for the requirements of patients and since her arrival has contributed to a large degree towards the high morale of patients within the Sanatorium.

ART THERAPY.

Under the influence and stimulus of Miss Mary Nunn a considerable number of patients have maintained interest in this aspect of occupational therapy.

SOCIAL SERVICES.

Miss Mary Walters resigned from the staff at the end of 1955, and her successor, Miss G. Paddon, who commenced work in March, has continued to administer to the requirements of patients in the social field. In all, 321 cases were seen during the year, a total number of 540 visits being made to them. Details of her services are as follows :—

State Housing Commission—	
Applications	36
Allocations	27
Financial Assistance—	
Tuberculosis Allowances	105
Invalid Pensions	4
Sickness Benefit	8
Mine Workers' Relief	2
Workers' Compensation	8
Others	5
Employment Problems	4
Marital Difficulties	3
Interpretation	9
Child Placement (including group placements)	6
Domestic Help	4
Home Visits	7
Royal Perth Hospital Cases Visited	79
Other Institution Visits	13
Accommodation	5
Travel Arrangements	15
Personal Service	96
Native Welfare Enquiries and Action	8

AMENITIES.

Amenities and entertainment were arranged by the rehabilitation and amenities officer, and in addition to the routine picture shows in the Recreation Hall twice weekly, 16 millimetre films were shown in the wards twice weekly by voluntary operators, and a series of lectures and recitals of Everyman's Music, arranged through the courtesy of the Adult Education Board, added to the patients' interest and entertainment. Once again we are indebted to the Red Cross Society, who continued to help both with financial assistance towards the cost of the Adult Education series, and with transport for artists and concert parties throughout the year.

VITAL STATISTICS.

Admissions.

Male	160
Female	92
Total	252

Method of Discovery.

A large percentage of the new admissions were discovered by mass X-ray surveys, both in the metropolitan area and in the country, a total of 97 in all being discovered through this agency. Details of method of discovery are as follows :—

Mass Survey—		
Metropolitan	62	
Country	35	
Total		97
Private Practitioners per Chest Clinic—		
Metropolitan	21	
Country	44	
Total		65
Private Doctors per Perth Radiological Clinic		2
Referred by Royal Perth Hospital (including 6 non-pulmonary)		20
Referred by Other Institutions (Fremantle Hospital, Claremont Mental Hospital, Kalgoorlie Laboratory, etc.)		11
Perth Chest Clinic (Follow-up Clinic, Volunteers, Routine re-employment)		57
Total		252

Of the 252 admissions, 218 were considered to be suffering from pulmonary tuberculosis. Of these 190 were active and 18 inactive. Eight patients were admitted with extrapulmonary tuberculosis, and four with pulmonary tuberculosis complicated by extrapulmonary disease. There were 22 non-tuberculous admissions as follows :—

Pulmonary Fibrosis (silicosis with unproven tuberculosis)	8
Bronchiectasis	3
Lobar Pneumonia	7
Eosinophilic Pneumonia	1
Lung Abscess	3

The part played by the activities of the Chest Clinic needs no emphasis. In its mass surveys it discovered 40 per cent. of new cases, as a result of its follow-up clinic 20 per cent, and through its assistance to metropolitan and more particularly country practitioners 22 per cent. As a fruitful source of cases, private practitioners still play an important part in the diagnosis of tuberculosis.

Readmissions.

Sixty-four persons were readmitted to the Sanatorium during the year, and a study of these cases, considering previous disease and treatment, gives some indication of the factors causing readmission. In the table which follows, the number of cases is listed in the first column, and the time interval between previous discharge and present admission in the second.

	Number.	Time Interval (months).
Gross disease with persistently positive sputum containing resistant organisms, discharged on compassionate grounds (including one case of silico-tuberculosis)	5	15
Advanced disease, apparently controlled on previous discharge	14	26
Silico-tuberculosis	2	39
Moderate or minimal disease, or old pleural effusion (in addition one case readmitted after 25 years)	15	49·5
Alcoholism, domestic and personal factors considered as contributory causes	9	23
Intercurrent illness, operations, etc.	3	40
Inactive disease readmitted for assessment	11	....
Non-tuberculosis disease, tuberculosis not previously excluded	4	....

Of the 14 chronic advanced cases, 12 had chemotherapy on previous admission for periods of from three to six months, but in only one case had chemotherapy been continued after discharge. Of the 60 tuberculosis cases readmitted, six had absconded from hospital following their previous hospital stay, but the sputum of all was negative when the patient left hospital previously. Apart from chemotherapy, a review of the previous treatment of the 60 cases suggested inadequacy of hospital stay or surgical management in only six. An infection of the extrapleural space necessitated the return of one case. The major factor would thus appear still to be the natural tendency of the disease to relapse, and it will be of considerable interest to note the late results of our present long-term chemotherapeutic regime.

Discharges.

Two hundred and fifty-seven patients were discharged from the Sanatorium, and of these eight only were regarded as " irregular " discharges, in whom the average stay was 38 weeks. Cases admitted for short periods for investigation and assessment numbered 53, leaving 196 " long-term " patients discharged on medical advice. The average stay in hospital of these patients was 46 weeks. Four only of the discharged patients had a positive sputum and all of these had had prolonged courses of chemotherapy on previous admissions and during their recent stay in hospital. One was given six weeks special leave and refused to return to the Sanatorium, being regarded as an irregular discharge. Her home conditions, however, are satisfactory. Two others have been given extended home leave to continue rest under good conditions, and the fourth was transferred to Linley Valley Colony as a permanent colonist.

Deaths.

Nineteen patients died at the Sanatorium and two others at Royal Perth Hospital shortly after thoracic surgery. Of these one had gross disease in the right lung and died of haemorrhage immediately following an extensive resection, and the other collapsed suddenly two weeks after a segmental resection for a non-tuberculous lung abscess. Of the 21 total deaths, eight (36 per cent.) were considered directly due to tuberculosis, and of these one patient, aged 73, died on the day of his admission. Three other patients had a persistently positive sputum, but died of conditions unassociated with their tuberculosis, one of hypostatic pneumonia following a fractured femur, one of lymphosarcoma, and one of arteriosclerotic gangrene of the leg following popliteal thrombosis. All of these patients were over 80 years of age. One patient with his tuberculosis completely under control died of congestive cardiac failure secondary to gross pulmonary fibrosis and emphysema, and eight others, with their tuberculosis completely under control, died of other conditions. With the exception of one of these patients, who was aged 68, all were over the age of 75. These figures would indicate that, except in rare cases, as a cause of death in young people tuberculosis has ceased to be of importance, notwithstanding its continued effect on the young adult population as a cause of temporary incapacity.

Leprosarium.

There were five patients treated for Hansen's disease in this section of the institution. All continue to make slow but satisfactory progress under the influence of Isoniazid, Conteben and the sulphones.

Maintenance and Repairs.

An extensive programme of external renovation and painting of the Sanatorium was undertaken by a team of Public Works Department plumbers and painters, with the complete renewal of all guttering and the painting of roofs and exteriors, as a result of which the appearance of the buildings generally has been improved considerably. In addition general maintenance and repairs have been effected throughout the Sanatorium.

The establishment of grass on the oval and improvements to the grounds and gardens have also improved the general appearance of the Sanatorium, and contributed to the comfort and general morale of the patients.

CONCLUSION.

In concluding this report I desire to express my appreciation to my medical officers for their constant loyalty and help, and to you, Sir, I express my thanks for your guidance and advice throughout the year. It is a pleasure to record our appreciation of the encouragement and help of the Commissioner of Public Health, and to the Under Secretary and staff of the Public Health Department, for their co-operation and attention at all times.

H. R. ELPHICK, M.B., B.S., M.R.C.P., M.R.A.C.P.,

Medical Superintendent.

Appendix Va.

REPORT ON THE ACTIVITIES OF THE SANATORIUM LABORATORY FOR THE YEAR ENDING 31st DECEMBER, 1956, BY E. DOILOV, SENIOR LABORATORY TECHNICIAN.

Apart from the routine laboratory tests listed for the annual report, the following investigations were carried out :—

(1) Study of the relative merits of Loewenstein-Jensen and Pencillin Blood Agar media ;

(2) Comparison of sputum, gastric and laryngeal cultures in the investigation of suspected tuberculosis ;

(3) Investigation of sensitivity of organisms to Streptomycin, Isoniazid and P.A.S. ;

(4) Investigation of the comparative merits of sulphuric acid, sodium hydroxide and tri-sodium phosphate in the digestion and concentration of gastric contents for cultures for tubercle bacilli.

Details of these investigations are submitted hereunder, and it is felt that a study of the investigations reveals interesting information which may materially assist our investigations in the future. In addition, the results of guinea pig inoculations are described, together with a comparison of the results of culture of sputum, using two, three and four culture tubes.

Comparison of Loewenstein-Jensen Medium and Pencillin Blood Agar, in the culture of Tubercle Bacilli.

During the period from June to October, a study was made of the comparative efficacy of Loewenstein-Jensen medium and Pencillin Blood Agar in the isolation and culture of myco-bacterium tuberculosis, 2,001 pathological specimens being subjected to investigation. The Blood Agar was supplied ready prepared by the Public Health Laboratories and the Loewenstein-Jensen medium was prepared at the Sanatorium according to the standard formula as described by Jensen (Mackie and McCartney, 1953).

As a routine, two tubes of Loewenstein-Jensen and two of Blood Agar were inoculated with suspect material after concentration. The specimens treated were as follows :—

Sputum	1,381	specimens
Laryngeal Swabs	418	,,
Gastric Contents	79	,,
Urine	94	,,
Pleural Fluid (Non-purulent)	11	,,
Purulent Discharge (Empyema, Discharging tuberculous hip, etc.)	11	,,
Faeces	3	,,
Vaginal Swab	1	,,

Sputum.

In the preliminary preparation of sputum, equal parts of sputum and 3·4 per cent. sulphuric acid were mixed and allowed to stand, with frequent shaking, for 35 minutes. Neutralisation was effected with 10 per cent. sodium hydroxide for thick sputum and 4 per cent. sodium hydroxide for thin, using bromthymol blue as an indicator. The neutralised homogenate was centrifuged for fifteen minutes, and the supernatent fluid discarded and the sediment inoculated on to the surface of the medium, two tubes of Loewenstein-Jensen and two of Pencillin Blood Agar being employed for each specimen.

Gastric Contents and Urine.

(1) For gastric contents and urine 3·4 per cent. sulphuric acid was used as for sputum.

(2) In addition, equal parts of the specimen were digested with 23 per cent. tri-sodium phosphate at 37°C. for 24 hours and neutralised with sulphuric acid.

(3) Equal parts of the specimen and 4 per cent. sodium hydroxide were mixed for 35 minutes followed by neutralisation with sulphuric acid.

Laryngeal Swabs.

These were placed in 1 per cent. sodium hexametaphosphate in ¼ normal saline for two minutes to dissolve the calgitex alginate wool. An equal amount of 3·4 per cent. sulphuric acid was then added and the mixture allowed to digest for 15 minutes, after which it was neutralised with 4 per cent. sodium hydroxide, centrifuged for 10 minutes and the sediment planted.

Observation.

Cultures were checked after seven days to observe contamination and the growth of acid and alcohol fast saprophytes. Subsequently, weekly inspections were made and the time of the earliest appearance of colonies noted.

Of the 2,001 specimens, 22 were sputum from old cases strongly positive on direct examination. Forty-eight were from new cases with positive direct smears and 21 were sputa negative on direct smear, but positive on concentration.

Positive Results.

From the 2,001 specimens, 281 positive cultures were obtained, consisting of :—

Sputum	227
Laryngeal Swabs	28
Gastric Contents	12
Urine	8
Pleural Fluid	1
Discharge from Wounds	2
Faeces	3

It was interesting to note that no growth was obtained in one specimen of sputum positive on direct smear (one organism per ten high power fields) ; one specimen of pus from a sinus (positive direct smear and concentration) ; one specimen of inspissated caseous material obtained from an encapsulated lesion at post mortem ; and two positive concentrates of sputum.

Comparative Results.

Of the 281 positive results, 250 were positive on both media, 18 on Loewenstein-Jensen only, and 13 on Blood Agar only. It was notable that in those cases positive on only one type of medium, the colonies were extremely sparse.

Speed of Growth.

Recognisable growth appeared on the media of both types from two weeks onwards ; a slightly greater percentage of positive cultures being obtained on Loewenstein-Jensen medium during the two to three week period. By the end of the fifth week, all positive cultures were apparent as such on both types of medium.

Time.	Loewenstein-Jensen Medium.	Progressive Percentage. %	Blood Agar Medium.	Progressive Percentage. %
2–3 weeks	160	59	136	52
3–4 weeks	85	91	94	88
4–5 weeks	23	100	33	100

Exuberance of Growth.

There was little, if any, difference in bacterial growth in the two media, the colony development apparently depending on the bacterial population, rather than the comparative nutritive value of the two media under investigation :—

	Loewenstein-Jensen.	Blood Agar.
1–5 colonies	49	40
5–10 colonies	50	55
10–50 colonies	48	55
50–100 colonies	23	28
Growth almost confluent	29	34
Growth confluent	51	49

The growth of organisms from 20 old cases treated for varying periods with anti-biotics without conversion of sputum was compared with that of organisms from 20 new cases prior to chemotherapy in whom the sputum was positive on direct smear. All organisms were cultivated on both media, and there was no significant difference in the efficacy of either medium in producing growth, the sputum from nine of the old cases and five of the new cases producing a more profuse growth on Loewenstein-Jensen than on Blood Agar, while that from seven of the old and four of the new produced better growth on Blood Agar than Loewenstein-Jensen.

Conclusion.

From a study of these figures, it can be seen that there is little to choose between Loewenstein-Jensen and Blood Agar as a culture medium. Using both types, a slightly higher number of positive results was obtained, but the difference would appear not to make it worthwhile continuing with the two different media.

The slight variation between the two may have been related to the necessity, in doubtful positive cases, to increase the number of tubes inoculated, irrespective of the type of medium employed. Thus, in the 13 cases positive on Blood Agar and negative on Loewenstein-Jensen, it might be assumed that had all the sputum been distributed on to four Loewenstein-Jensen tubes instead of two Loewenstein-Jensen and two Agar Slopes, one or more of the Loewenstein-Jensen cultures would have produced growth of organisms. This possibility will be tested by using four tubes of one or other medium in investigating new admissions.

On present indications, however, it may be stated that Loewenstein-Jensen and Pencillin Blood Agar are of equal efficacy in the cultivation of tubercle bacilli, but that an important factor in the successful culture of scanty organisms in sputum is the use of multiple culture tubes.

A COMPARISON OF SPUTUM, GASTRIC, AND LARYNGEAL CULTURE IN THE INVESTIGATION OF SUSPECTED TUBERCULOSIS.

One hundred and fourteen patients with sputum negative on direct smear were subjected to further investigation, using culture of sputum when available, and/or gastric contents and laryngeal swabs. As a general rule, three specimens of fasting gastric contents, and laryngeal swabs taken on three successive days, were cultured, and any sputum available on the corresponding six days was processed in the same way. Sixty-four patients had laryngeal and gastric cultures, and of these sputum was available in 47. Forty-four had sputum and laryngeal cultures, and six had sputum and gastric cultures. The results were as follows :—

Group 1.—Sixty-four cases of laryngeal and gastric culture (sputum present in 47).

Sputum, laryngeal and gastric cultures all positive	6
All tests negative	30
Sputum and gastric culture positive, laryngeal culture negative	5
Sputum positive, gastric and laryngeal culture negative	7
Gastric culture positive, sputum and laryngeal culture negative	4
Sputum and laryngeal culture positive, gastric culture negative	1
Laryngeal culture positive, sputum and gastric culture negative	3
Laryngeal and gastric culture positive, sputum culture negative	1
Laryngeal and gastric culture positive, no sputum	7

Group 2.—Forty-four cases of sputum and laryngeal culture.

Both positive	12
Sputum positive, laryngeal culture negative	12
Laryngeal culture positive, sputum negative	1
Both negative	18

Group 3.—Six cases of sputum and gastric culture.

Both positive	3
Sputum positive, gastric culture negative	1
Gastric culture positive, sputum negative	1
Both negative	1

Of the 108 laryngeal cultures, therefore, 32 only were positive. Of 70 gastric cultures, 27 were positive, and of 94 sputum cultures, 47 were positive. Excluding the cases negative on all investigations, the positive results of each method, in relation to the number of tests, were as follows :—

Material.	No. of Cases.	No. Positive.	Percentage.
Sputum	27 + 25 + 5 = 57	47	82·4
Gastric Contents	34 + 5 = 39	27	69·2
Laryngeal Cultures	34 + 26 = 60	32	52·3

From the above figures, it is obvious that when sputum is available, it is the most fruitful source of organisms. The comparatively poor results of laryngeal swabs were apparently related to the earlier techniques of culture, and efforts were made throughout the year to improve these.

Method 1.—*Direct Inoculation from the Swab.*

When laryngeal swabs were first introduced, an ordinary cotton wool swab was used on a galvanised iron wire. This was placed in a tube containing 5 per cent. oxalic acid for 15 to 30 minutes to eliminate contamination. The oxalic acid was then poured off and inoculation was made directly on to Loewenstein-Jensen medium with the swab. The result was not satisfactory, and the method was modified thus :

> The swab was first placed in 6 per cent. sulphuric acid for five minutes and the fluid discarded ; 4 per cent. sodium hydroxide was added for five minutes and the fluid again discarded, the swab then being used to inoculate the medium. Again results were disappointing.

Method 2.—*Inoculation from Treated, Centrifuged Sediment.*

The swab was made from calgitex wool (Batch No. 12, E.9.A was found particularly satisfactory, being of long weave) on aluminium copper wire, and the end was covered first with ordinary cotton wool, with a good swab of calgitex wool superimposed.

Procedure 1.

Swabs were placed in hexametaphosphate 1 per cent. in $\frac{N}{4}$ saline for 15, 20, and 30 minutes. The fluid was centrifuged, the supernatant fluid discarded and the sediment planted on the medium. This method also gave poor results.

Procedure 2.

Swabs were placed in a tube containing 9 ml. of sterile hexametaphosphate 1 per cent. in $\frac{N}{4}$ saline for two to three minutes to dissolve the calgitex wool. An equal amount of 3·4 per cent. sulphuric acid was then added and the mixture allowed to digest for 15 minutes, after which it was neutralised with 4 per cent. sodium hydroxide and centrifuged for 15 minutes. The supernatant fluid was poured off and from the sediment three loops were planted on to the medium. This method was used during the latter six months, and gave much more satisfactory results, with only 2 to 3 per cent. contamination. During this period 28 patients with scanty or no sputum, who were negative on direct smear examination, had parallel sputum cultures (when available) and gastric and laryngeal cultures, the results of which were as follows :—

Positive gastric culture and laryngeal culture	17
Positive gastric culture, negative laryngeal culture	4
Negative gastric culture, positive laryngeal culture	7

Sputum culture was positive in 14 of the above, negative in six, and there was no sputum available for examination in eight. In this latter series, therefore, laryngeal swabs appeared superior to gastric culture, and it is therefore considered reasonable to subject the method to a further period of comparative study.

CULTURES FOR RESISTANCE TO STREPTOMYCIN, P.A.S., AND ISONIAZID.

During the year 86 cultures and seven positive sputum specimens were used for the determination of organism resistance to the various chemotherapeutic agents, 1,500 tubes in all being inoculated. There were 88 patients for Streptomycin resistance tests, 93 for Isoniazid resistance, and 73 for P.A.S. resistance. As a routine the sputum of patients still positive either on direct smear or cult [illegible] month following admission, was subjected to resistance tests in respect to all three drugs.

Loewenstein-Jensen medium was used with drugs incorporated as follows :—

Streptomycin	2, 20, and 100 micrograms per ml.
P.A.S.	1, 10, 50, and 100 micrograms per ml.
Isoniazid	0·04, 0·1, 0·4, 1, 5, 20, 50, 100, and 200 micrograms per ml.

Inoculation was made directly from positive culture tubes and not standardised. During 1955 our experience showed the necessity for controlling the size of the inoculum, when two cases were found in which the apparent sensitivity was dependent upon the size of the inoculum.

Patient R.D.R.

Sputum which was positive on direct smear (five organisms per oil immersion field) showed sensitivity to all three drugs, but in a culture of this sputum, resistance to 100 micrograms of Streptomycin, 100 micrograms of P.A.S. and 200 micrograms of Isoniazid was apparent.

Patient G.S.

Sputum, positive on direct smear (1/1) was sensitive to all three drugs. However, the organisms grown on culture were found to be resistant to 20 micrograms of Streptomycin, 50 micrograms of Isoniazid, and 100 micrograms of P.A.S. per ml.

It is intended in future in testing for resistance, to use cultures, and to dilute one wire loopful of colony in one ml. of sterile normal saline in a test tube containing glass beads. The contents will be shaken for five minutes and two loops of the homogenous emulsion will be planted on the drug containing medium.

THE INVESTIGATION OF THE COMPARATIVE MERITS OF SULPHURIC ACID, SODIUM HYDROXIDE, AND TRISODIUM PHOSPHATE IN THE DIGESTION AND CONCENTRATION OF GASTRIC CONTENTS.

The fasting gastric contents of 12 positive patients were studied, employing three methods for the digestion and elimination of contaminants. For each of the 12 patients, 36 culture tubes were used. The samples of gastric contents were divided into three, and to the first was added an equal amount of sulphuric acid 3·4 per cent. The mixture was digested for 35 minutes and neutralised with 4 per cent. sodium hydroxide. The second tube received an equal amount of 4 per cent. sodium hydroxide and was neutralised for 35 minutes with 3·4 per cent. sulphuric acid. The third tube, after the addition of an equal amount of 23 per cent. trisodium phosphate, was kept in the incubator at 37 degrees centigrade for 24 hours. The tubes were centrifuged and from the sediment in each, three loops were planted on to each tube of culture.

From the 432 tubes employed for the 12 patients, 62 tubes only were positive. Using the first method (sulphuric acid neutralised with 4 per cent. sodium hydroxide), 24 tubes were positive. The second method (sodium hydroxide neutralised by sulphuric acid), produced 23 positive tubes, and trisodium phosphate concentration produced 15 positive tubes. From the clinical point of view, if the gastric contents are positive, the inference is that the patient has active tuberculosis. However, the results were such that a negative test could hardly be regarded as evidence of completely inactive disease. Of the 12 cases, three only were positive on each of the three days, four were positive on two days, and five were positive on only one day. In only two cases were all the culture tubes positive using all three methods, and two days later one of these was negative in all 12 culture tubes. In 10 cases, from the total 36 test tubes employed for each over the three days, one tube only was positive in three, two were positive in one, three in two, four in one case, five in two, and six in one case. This analysis indicates that no one technique can be singled out as superior for the isolation of the organisms. If large numbers of bacilli are present all tubes will be positive, and there is no apparent difference between the various methods employed. A small number of bacilli, however, necessitates the employment of multiple tubes for isolation, and this may explain why in some patients positive gastric culture at Perth Chest Clinic or at the Public Health Laboratories has not been confirmed at Wooroloo.

RESULTS OF GUINEA PIG INOCULATION.

During the year 66 pigs were inoculated, and of these, nine, or 13·6 per cent. died, the causes of death being a heat wave in the case of six and gastro-enteritis in the case of three. The average accidental mortality during the past years has been between 3 and 4 per cent. only. Of the 57 pigs which survived for six weeks after inoculation and which were then sacrificed and examined, eight were positive following injection of gastric contents, the cultures having also been positive. Thirty-five inoculated with gastric contents showed no evidence of tuberculosis, and in these 35 also, the gastric cultures were negative. Eleven guinea pigs were inoculated with suspected colonies of tubercle bacilli from culture tubes, and of these, seven were positive, one was negative, and three died. Six guinea pigs inoculated with the effluent from septic tanks were all negative.

MULTIPLE TUBE CULTURE OF TUBERCLE BACILLI.

During 1954 and 1955, three tubes were inoculated with the sediment after concentration of sputum and gastric contents. This procedure was continued for the first half of 1956, after which four tubes were used as a routine. Using these multiple tubes it was apparent during 1954 and 1955 that in a considerable number of cases only one or two of the three tubes inoculated grew colonies of tubercle bacilli, and this experience was again confirmed in 1956. Hereunder is a table representing the number of positive tubes observed after inoculation of four in 1956, and three in 1954 and 1955 :—

	1954.		1955.		1956.	
		%		%		%
Four tubes positive	....		....		225	53
Three tubes positive	374	70	476	58	57	13·4
Two tubes positive	94	17·6	64	10	85	20
One tube positive	65	12·3	77	12	56	13·4

It can thus be said that if only one tube were used we might expect a negative result in approximately 50 per cent. of positive cases, and it is reasonable to assume that if more tubes were used we might get a slightly higher number of positives from doubtful cases. However, it is intended to continue using four tubes as a routine, as any increase on this number would prove unwieldy and inconvenient with the present staff and equipment which is at our disposal.

Appendix Vb.

State of Western Australia.

PULMONARY TUBERCULOSIS NOTIFICATIONS FOR THE YEAR ENDING 31ST DECEMBER, 1956. SHOWING AGE, SEX, FORM AND STAGE OF DISEASE.

Age Group.	Males.					Females.					Persons.				
	Pulmonary.			Pleural Effusion.	Total.	Pulmonary.			Pleural Effusion.	Total.	Pulmonary.			Pleural Effusion.	Total.
	Min.	Mod.	Adv.			Min.	Mod.	Adv.			Min.	Mod.	Adv.		
0– 4	3	....	....	....	3	2	....	....	....	2	5	....	....	....	5
5– 9	1	....	....	....	1	4	....	1	....	5	5	....	1	....	6
10–14	1	....	....	....	1	....	....	....	....	....	1	....	....	....	1
15–19	2	2	....	....	4	1	1	....	1	3	3	3	....	1	7
20–24	2	6	1	....	9	3	5	1	1	10	5	11	2	1	19
25–29	7	10	5	1	23	8	5	....	1	14	15	15	5	2	37
30–34	11	13	1	....	25	6	11	2	1	20	17	24	3	1	45
35–39	5	6	....	1	12	10	10	1	....	21	15	16	1	1	33
40–44	10	13	5	1	29	2	9	5	....	16	12	22	10	1	45
45–49	9	16	4	....	29	2	4	....	....	6	11	20	4	....	35
50–54	8	18	7	....	33	2	9	....	....	11	10	27	7	....	34
55–59	3	18	7	....	28	2	9	2	....	13	5	27	9	....	41
60–64	2	15	2	....	19	....	2	2	....	4	2	17	4	....	23
65–69	5	13	12	....	30	....	....	1	1	2	5	13	13	1	32
70–74	4	10	3	....	17	1	5	....	....	6	5	15	3	....	23
75–	9	6	10	....	25	1	1	....	....	2	10	7	10	....	27
N./S.	1	....	....	....	1	....	....	....	....	....	1	....	....	....	1
Total	83	146	57	3	289	44	71	15	5	135	127	217	72	8	424

Appendix Vc.

State of Western Australia.

TUBERCULOSIS CASE REGISTER AS AT 31ST DECEMBER, 1956. SHOWING AGE, SEX, FORM AND STAGE OF DISEASE.

Age Group.	Males.					Females.					Persons.					Total.
	Pulmonary.			Non Pulm. T.B.	N./S.	Pulmonary.			Non Pulm. T.B.	N./S.	Pulmonary.			Non Pulm. T.B.	N./S.	
	Min.	Mod.	Adv.			Min.	Mod.	Adv.			Min.	Mod.	Adv.			
0– 4	4	2	....	7	(*a*) 1	1	....	....	14	(*a*) 3	5	2	....	21	4	32
5– 9	8	1	1	6	(*a*) 2	6	3	2	9	(*a*) 4	14	4	3	15	6	42
10–14	6	2	1	4	1	....	1	....	8	....	6	3	1	12	1	23
15–19	3	4	1	5	1	6	6	3	4	1	9	10	4	9	2	34
20–24	18	17	3	2	....	20	26	5	....	2	38	43	8	2	2	93
25–29	32	48	14	11	4	44	45	10	5	7	76	93	24	16	11	220
30–34	69	83	16	4	2	65	85	14	7	1	134	168	30	11	3	346
35–39	66	86	21	7	3	56	73	20	2	1	122	159	41	9	4	335
40–44	62	106	30	8	....	49	75	16	4	3	111	181	46	12	3	353
45–49	55	131	32	3	3	22	52	19	6	1	77	183	51	9	4	324
50–54	37	153	55	3	4	14	36	13	5	1	51	189	68	8	5	321
55–59	29	123	54	5	3	18	46	10	1	1	47	169	64	6	4	290
60–64	21	106	28	2	1	9	15	10	1	....	30	121	38	3	1	193
65–69	25	91	42	1	1	7	23	5	3	1	32	114	47	4	2	199
70–74	17	46	26	....	1	3	16	5	....	....	20	62	31	....	1	114
75–	17	42	26	2	1	4	9	3	....	....	21	51	29	2	1	104
N./S.	5	4	1	4	....	2	3	1	3	....	7	7	2	7	....	23
Total	474	1,045	351	74	28	326	514	136	72	26	800	1,559	487	146	54	3,046

(*a*) Primary.

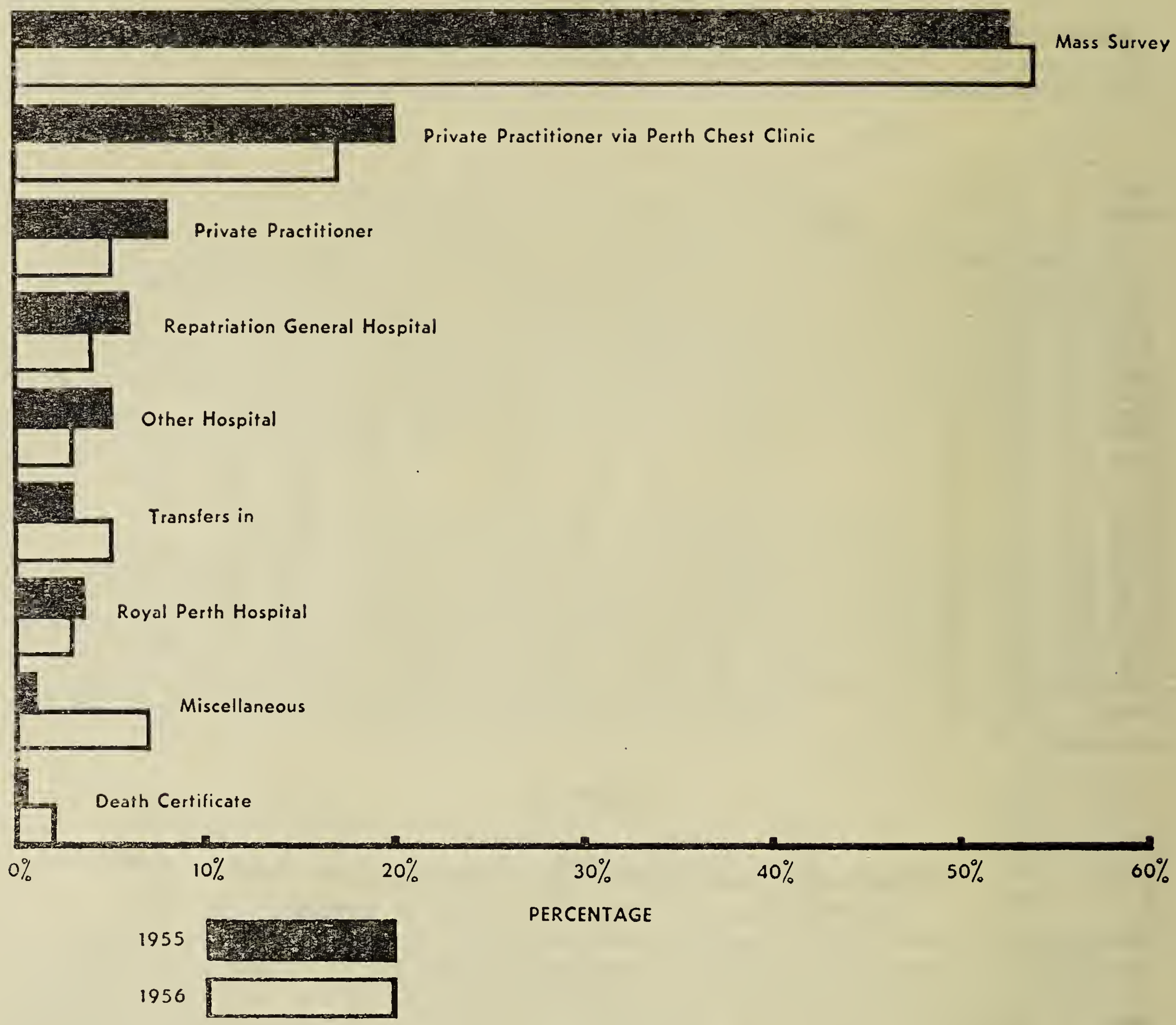
Appendix Vd.

The supervision of the register as at 31st December 1956, is as follows :—

Perth and Fremantle Chest Clinics	1,534
Repatriation Commission	755
Wooroloo Sanatorium (includes out patients)	279
Claremont Mental, Royal Perth Hospital, and other hospitals	173
Private Practitioners (including country T.B. Officers)	301
Unknown	4
Total	3,046

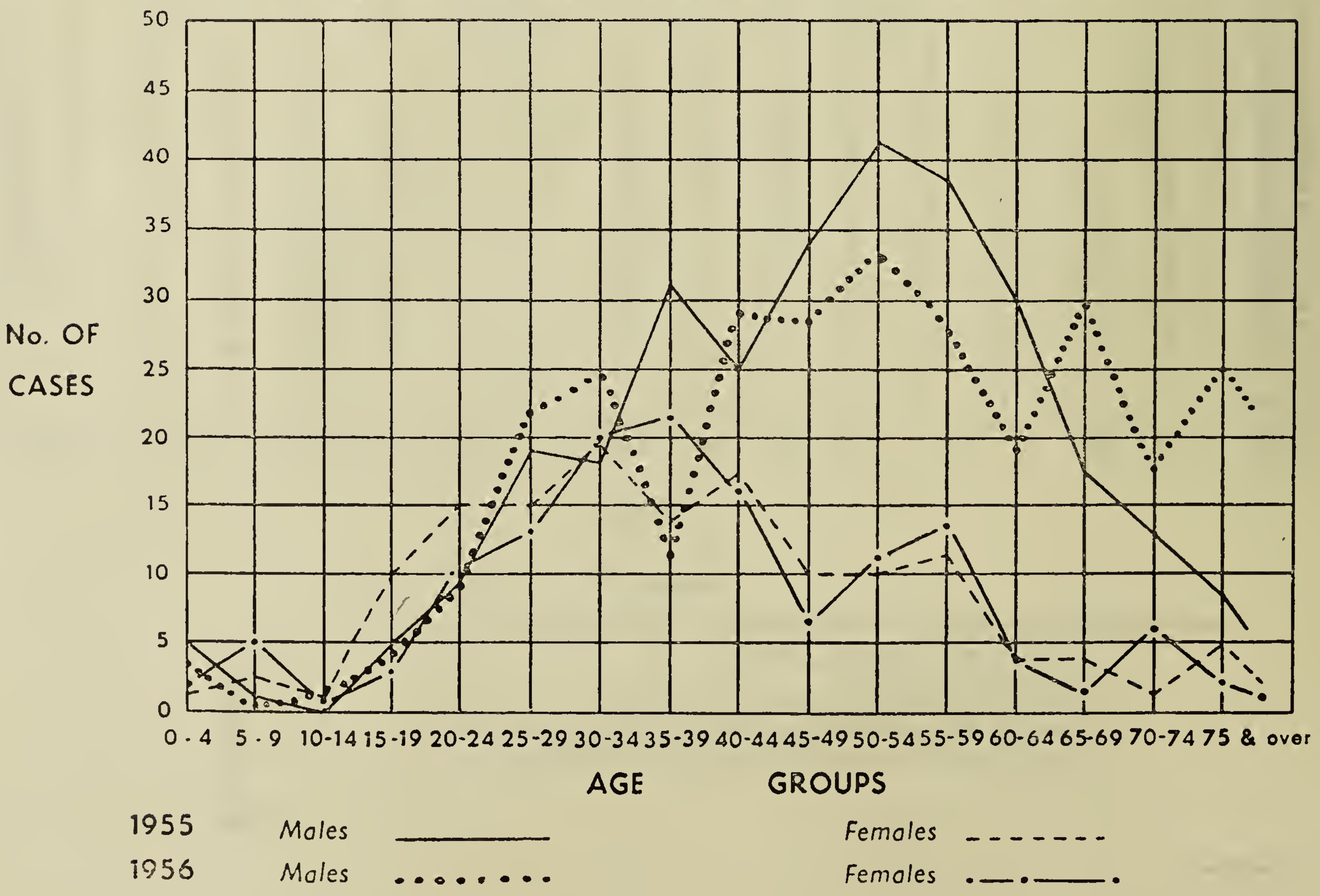
Appendix Ve.

GRAPH SHOWING THE SOURCE OF NOTIFICATION OF CASES OF PULMONARY TUBERCULOSIS AS PERCENTAGE OF TOTAL NOTIFICATIONS. 1955 AND 1956.



Appendix Vf.

GRAPH SHOWING AGE DISTRIBUTION OF PULMONARY T.B. NOTIFIED IN 1955 AND 1956.



Appendix VI.

Western Australia.

PULMONARY TUBERCULOSIS.

Year.	Population in 1,000s.	Notifications Received.	Incidence Rate per 100,000 Population.	Deaths Registered.	Mortality Rate per 100,000 Population.
1911	287	259	90·2	190	66·2
1912	301	429	142·5	220	73·1
1913	313	424	135·5	206	65·8
1914	323	353	109·3	229	70·9
1915	321	336	104·7	233	72·6
1916	313	511	163·5	225	71·9
1917	306	464	151·6	217	70·9
1918	308	432	140·5	245	79·5
1919	320	467	145·9	289	91·6
1920	330	442	133·9	259	78·4
1921	334	424	126·9	277	82·9
1922	341	387	113·8	256	75·1
1923	351	361	102·8	216	61·5
1924	363	381	104·6	228	62·8
1925	373	403	108·4	259	69·4
1926	381	415	108·2	252	66·1
1927	392	409	104·3	231	56·4
1928	408	395	96·8	282	69·1
1929	421	400	95·0	245	53·4
1930	429	569	132·6	218	50·8
1931	432	372	86·1	223	51·6
1932	435	339	77·9	203	46·7
1933	439	295	67·2	207	47·2
1934	442	287	64·9	218	49·3
1935	447	270	60·4	210	47·0
1936	452	338	74·8	193	42·7
1937	457	239	53·0	172	37·6
1938	464	247	53·2	177	38·1
1939	470	202	43·0	179	38·1
1940	473	231	48·8	181	38·3
1941	474	154	32·5	185	39·0
1942	477	113	23·7	175	36·7
1943	477	273	57·3	144	30·2
1944	481	219	45·4	134	27·9
1945	488	271	55·5	149	30·5
1946	493	343	69·6	163	33·1
1947	502	372	74·0	128	25·4
1948	515	325	63·1	157	30·5
1949	533	499	93·6	123	23·1
1950	558	586	104·8	129	23·1
DEATH CLASSIFICATIONS ACCORDING TO 6TH (1948) INTERNATIONAL LIST.					
1950	558	586	104·8	125	22·4
1951	580	467	80·4	76	13·1
1952	601	508	84·4	75	12·5
1953	621	378	60·6	43	6·92
1954	640	348	54·3	57	8·9
1955	659	413	62·7	31	4·7
1956	677	424	62·6	43	6·3

Appendix VII.

REPORT BY THE DIRECTOR OF EPIDEMIOLOGY

During the year under review there was a reduction in the incidence of diphtheria, the intestinal group of infections, and most of the other communicable diseases which are notifiable. There was, however, a severe epidemic of poliomyelitis and a limited outbreak of diphtheria ; while influenza, although not notifiable, was known to have been unduly prevalent during the winter.

The outstanding accomplishment of the year was the Poliomyelitis Immunisation Project, one of the most massive preventive measures ever applied by the Department. It was launched at the beginning of July, and by the end of the year the " two-dose under fifteen " programme had passed the half-way mark with about 100,000 children protected.

Laboratory assistance during the year was most valuable. Co-operation during outbreaks was conspicuous, while routine services were of high quality. Special help in despatching virus material to the Eastern States, in establishing the Salk Syringe Service, and in several other ways greatly facilitated the investigation and control of infectious diseases. The appointment of the newly installed Professor of Microbiology as Consultant to the Department is significant, and should lead to further progress particularly in the development of a virus unit.

Although virus diseases other than poliomyelitis are not yet dominant public health problems in this state, they account for appreciable morbidity and are potential epidemic hazards. There is clinical and serological evidence of occasional outbreaks of Bornholm Disease and other Coxsackie infections. Disease consistent with A.P.C. virus infection has been observed, while E.C.H.O. viruses have recently been isolated in Melbourne from West Australian material taken from children with meningitis and encephalitis. Influenza outbreaks are frequent, and the common virus diseases of childhood are widespread. Opportunities for profitable investigation are therefore numerous and the establishment of a Virus Laboratory warrants earnest consideration. Western Australia is now the only mainland state without virus diagnostic facilities, and until these are provided progress will remain handicapped.

The following special topics which warrant extended comment are dealt with separately :—

1. The Third Poliomyelitis Epidemic.
2. The Poliomyelitis Immunisation Project.
3. Diphtheria : An Outbreak of " Contact-Positives ".
4. Influenza "A": An Outbreak in a Country Town.
5. The Mosquito Survey.
6. Health Education : Its Value in Controlling infectious Diseases.
7. An Epidemic of Polyarthritis of Unknown Aetiology.

POLIOMYELITIS: THE THIRD WEST AUSTRALIAN EPEDEMIC

By

Dr. D. J. R. Snow

During the summer of 1956, a third epidemic of poliomyelitis occurred in Western Australia. It will be recalled that the first epidemic occurred in the winter of 1948, and the second during the summer of 1954. Although the behaviour of epidemic poliomyelitis is notoriously unpredictable, the occurrence of a third epidemic so soon after the second was rather unexpected.

Its dimensions, time-span, and relationship to the two previous epidemics are indicated in the accompanying histogram (Figure 1). The special features of this epidemic were (1) Its undue clinical severity with a high proportion of respirator cases ; (2) The high incidence of the disease in young adults, particularly in the 25–29 age group ; (3) The causative virus (Type III) has not previously been encountered in any Australian epidemic.

The epidemic accounted for the great majority of the 401 cases recorded during the whole of 1956. Only 40 per cent of these cases were under the age of 15 years, the remaining 60 per cent being over that age, and mainly within the 15–34 age span. There were 12 deaths (a case fatality of 3 per cent.), and 32 out of 108 hospital admissions with the paralytic form of the disease required treatment in mechanical respirators. The severity of paralysis in young men from the country was even more conspicuous than in former epidemics. The age and sex incidence and the relative proportion of urban as opposed to rural cases are set out in Table 1 ; the monthly incidence in Table II ; and the relative age incidence as compared with previous epidemics is shown in Table III.

Faeces and paired sera from some 50 patients were sent to Melbourne, and from the majority Type III virus was recovered, or significant serological titres were detected. General epidemiological investigations during the epidemic disclosed no remarkable features. The mode of transmission appeared to be by personal contact, and the distribution of cases conformed to the usual pattern. Serial spot maps of the Perth area show the disposition and progression of cases in the three epidemics (Figure II).

Control measures applied with the approval of the State Poliomyelitis Advisory Committee included (1) Isolation of patients ; (2) " House and garden " quarantine of child contacts ; (3) Administration of gamma globulin to household contacts ; (4) Deferment of tonsillectomies ; (5) Intensified hand hygiene (6) Cancellation of school swimming classes, youth camps, and the like.

The policy of home treatment for the less severe cases, adopted during the 1954 epidemic, was maintained with advantage ; while organised immunisation against the common childhood diseases was continued throughout the epidemic without incident.

Summary

A third and unusually severe epidemic of poliomyelitis involving some 400 cases and 12 deaths occurred during the summer of 1956. It was due to a type of polio virus (III) not previously encountered in Australian epidemics. Incidence in young adults was unusually high, and a high proportion of these needed respiratory treatment. The general epidemiology was not remarkable, and orthodox control measures were applied.

DATA RELATING TO ADMISSIONS AT THE INFECTIOUS DISEASES HOSPITAL

Provided by Dr. H. J. H. Colebatch

Admitted with suspected poliomyelitis	190
Diagnosis confirmed	144 (P. 108 ; NP. 36)
Regarded as non-poliomyelitic	46
Patients treated in mechanical respirators (" Tanks " or " iron lungs ")	32
Spinal paralysis alone	13
Central respiratory failure	1
Spinal as well as bulbar paralysis (involving difficulty swallowing)	18
Patients with bulbar paralysis not necessitating mechanical respiration	12
Total " respirator " and /or " bulbar " patients	50

Distributed throughout the year this number of patients could have been handled without creating a desperate situation. The main factor in the creation of emergencies was the arrival of patients requiring respirator treatment in successive groups. Twenty-six new respirator patients were treated in the first three months of 1956—5 in the first two weeks of January, 5 in the first 10 days of February, 7 in the last two weeks of February, and 9 in March. As many as three new patients were admitted in one day.

I have indicated the problem the epidemic presented from the hospital point of view in an article "Tank Warfare", Royal Perth Hospital Journal Vol. 9, page 245, and will only mention here, that at the end of the first two weeks in January there were six patients in respirators, then a record for this hospital. This was later exceeded in February, when a maximum of 13 patients were being treated in respirators at the same time. Another important aspect of treatment was the successful transport of 9 patients requiring respiratory aid from outlying areas.

It is interesting to realize the good prognosis for respirator patients. This has been pointed out by Dr. J. E. Affeldt*, Rancho Los Amigos, where their figures indicate that 80 per cent. of those who survive respirator treatment gain respiratory independence. The remainder may be independent of respiratory aids during the day by means of frog breathing and can be removed from the respirator to lesser aids such as cuirass respirators or rocking beds. All medically stable patients can be discharged from hospital no matter how severe their respiratory weakness and for some years the Rancho Los Amigos has conducted an out-patients' service, which in 1954 was responsible for the care of some 70 patients.

In comparison, our own figures are of some interest : Of 32 tank treated patients, 22 survived the acute stage, *i.e.* the first month, one subsequently dying after several months. Of the 21 survivors, 17 have complete respiratory independence and we are left with 4 who still depend to some extent on mechanical aids. Of these 4, one depends on frog breathing for daytime independence and uses the cuirass at night ; one has attained nearly complete independence from mechanical aids by extending the time he uses frog breathing during the day and thus resting his normal respiratory muscles (he will, however, require a cuirass) ; one uses a rocking bed for sleeping and one other requires the cuirass at night and for an hour or two during the day.

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* " The Prognosis for Respiratory Recovery in Severe Poliomyelitis." Affeldt, J. E., et alii., Arch. Phys. Med. & Rehab.

Table I

POLIOMYELITIS, W.A., 1956

	Paralytic						Non-Paralytic						Not Specified						Total All Types						Total		
	Metropolitan			Country			Metropolitan			Country			Metropolitan			Country			Metropolitan			Country					
	M.	F.	Total	M.	F.	Total	M.	F.	Total	M.	F.	Total	M.	F.	Total	M.	F.	Total	M.	F.	Total	M.	F.	Total	M.	F.	Total
0–4	9	6	15	5	8	13	3	1	4	2	7	9	2	1	3	3	3	6	14	8	22	10	18	28	24	26	50
5–9	6	10	16	14	4	18	8	6	14	6	5	11	4	1	5	....	....	....	18	17	35	20	9	29	38	26	64
10–14	3	4	7	6	3	9	7	6	13	6	6	12	2	1	3	1	....	1	12	11	23	13	9	22	25	20	45
15–19	3	5	8	3	3	6	2	12	14	2	7	9	1	1	2	1	2	3	6	18	24	6	12	18	12	30	42
20–24	2	9	11	6	1	7	4	9	13	7	6	13	....	1	1	....	1	1	6	19	25	13	8	21	19	27	46
25–29	4	8	12	7	5	12	5	13	18	2	10	12	....	2	2	1	3	4	9	23	32	10	18	28	19	41	60
30–34	1	9	10	4	4	8	5	9	14	7	4	11	1	1	2	....	....	....	7	19	26	11	8	19	18	27	45
35–39	4	2	6	2	2	4	3	1	4	2	3	5	1	....	1	....	....	....	8	3	11	4	5	9	12	8	20
40–44	2	2	4	....	1	1	2	4	6	....	3	3	....	1	1	....	1	1	4	7	11	....	5	5	4	12	16
45–49	....	1	1	....	....	....	1	....	1	....	....	....	....	....	....	....	2	2	1	1	2	....	2	2	1	3	4
50 and over	1	....	1	2	1	3	1	....	1	....	....	....	....	2	2	....	....	....	2	2	4	2	1	3	4	3	7
Not stated	....	....	....	....	....	....	....	....	....	2	....	2	....	....	....	....	....	....	....	....	....	2	....	2	2	....	2
Totals	35	56	91	49	32	81	41	61	102	36	51	87	11	11	22	6	12	18	87	128	215	91	95	186	178	223	401

Totals : 172 Paralytic, 189 Non-Paralytic, 40 Not Specified.

1956—POLIOMYELITIS NOTIFICATIONS—BY MONTHS

Month	Paralytic	Other	Total
January	81	70	151
February	49	94	143
March	20	45	65
April	9	14	23
May	9	1	16
June	2	2	4
July	1	....	1
August	....	2	2
September	1	....	1
October	....	....	....
November	....	....	....
December	....	1	1
January-December	172	229	401

Table II

RELATIVE AGE INCIDENCE : THREE EPIDEMICS

Age Group	1948		1954		1956		1948, 1954 and 1956	
	Cases	Proportion	Cases	Proportion	Cases	Proportion	Cases	Proportion
		%		%		%		%
0–4	64	20·6	104	23·9	50	12·4	218	19·0
5–9	81	26·1	62	14·2	64	16·0	207	18·0
10–14	48	15·4	44	10·1	45	11·2	137	11·9
15–19	38	12·2	42	9·6	42	10·5	122	10·6
20–24	32	10·3	42	9·6	46	11·5	120	10·5
25–29	17	5·5	44	10·1	60	15·0	121	10·5
30–34	15	4·8	50	11·5	45	11·2	110	9·6
35–39	9	2·9	18	4·1	20	5·0	47	4·1
40–44	6	1·9	17	3·9	16	4·0	39	3·4
45–49	....	....	5	1·2	4	1·0	9	0·8
50–54	1	0·3	8	1·8	7	1·7	16	1·4
Not stated	....	....	....	....	2	0·5	2	0·2
All Ages	311	100·0	436	100·0	401	100·0	1,148	100·0

Table III

THE POLIOMYELITIS IMMUNISATION PROJECT

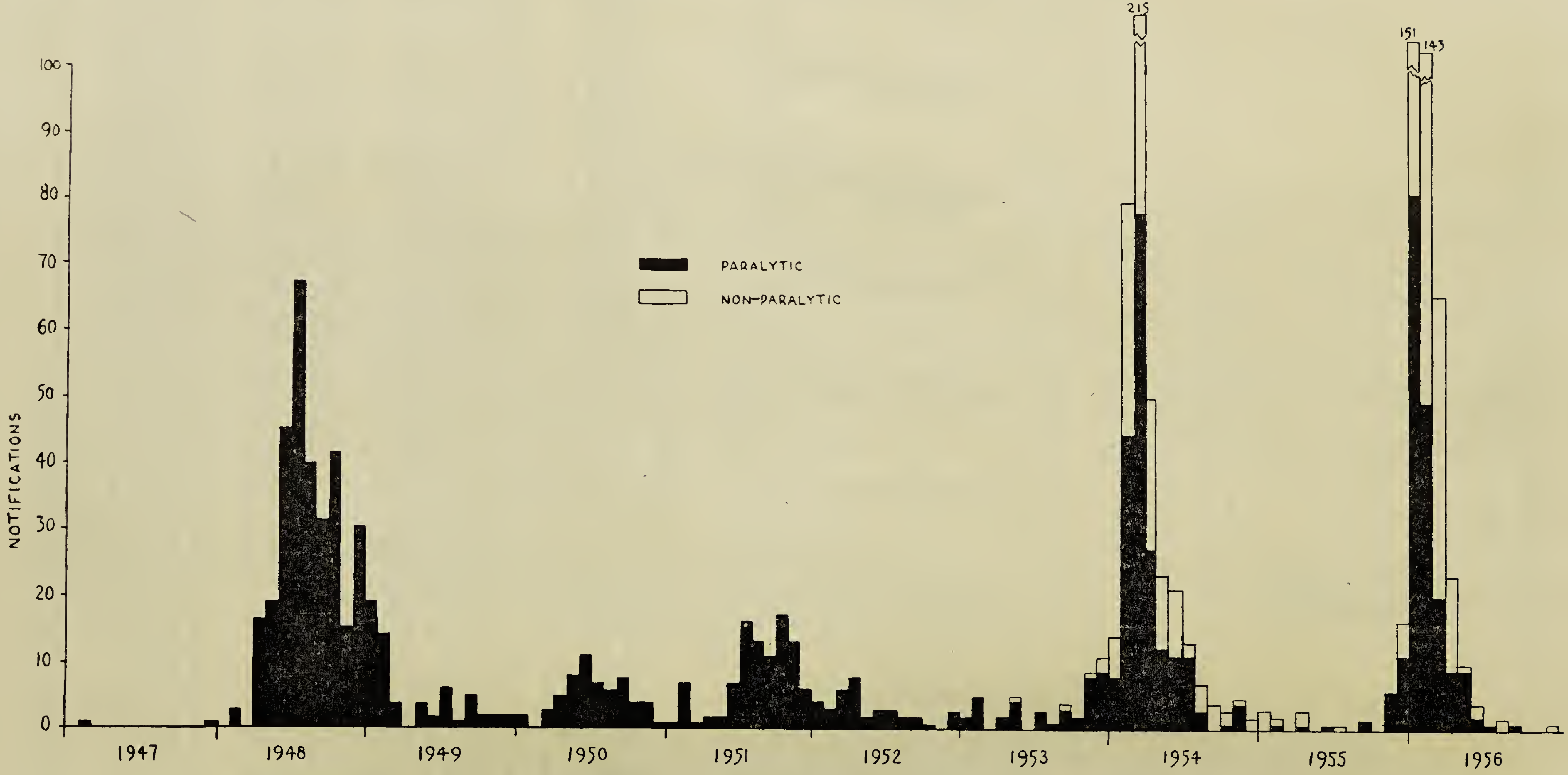
The terms and conditions of issue of Salk vaccine by the Commonwealth Government to the States were outlined in the Annual Report for 1955. Western Australia's allocation was to be about 30,000 doses every month. The first consignment was received at the end of June, and the immunisation campaign began on July 2, with the anticipation that nearly one-half of the State's 190,000 children could be protected with two doses of vaccine by the end of 1956.

Attainment of the maximum acceptance rate of the vaccine involved an educational campaign designed to place the known facts before as many parents as possible, explain the Cutter incident and describe precautions which had been taken in Australia to ensure maximum safety of the vaccine. With the co-operation of the Health Education Council therefore a series of newspaper articles and radio broadcasts were arranged ; and at the request of the Parents and Citizens' Federation numerous lectures were undertaken. These proved most popular and would have contributed to the unexpectedly high acceptance rate of 97 per cent. among the parents of school children, and this despite a certain amount of ill-informed but active and organised opposition.

The general immunisation plan was designed on a geographical basis. Sectors in the metropolitan area and zones in the country were to be immunised progressively and in systematic sequence instead of carrying out a small number of immunisations simultaneously at a large number of scattered points. The bulk of these immunisations were to be conducted from four mobile clinics, the remainder by selected stationary clinics established by special arrangement with local health authorities and certain public hospitals.

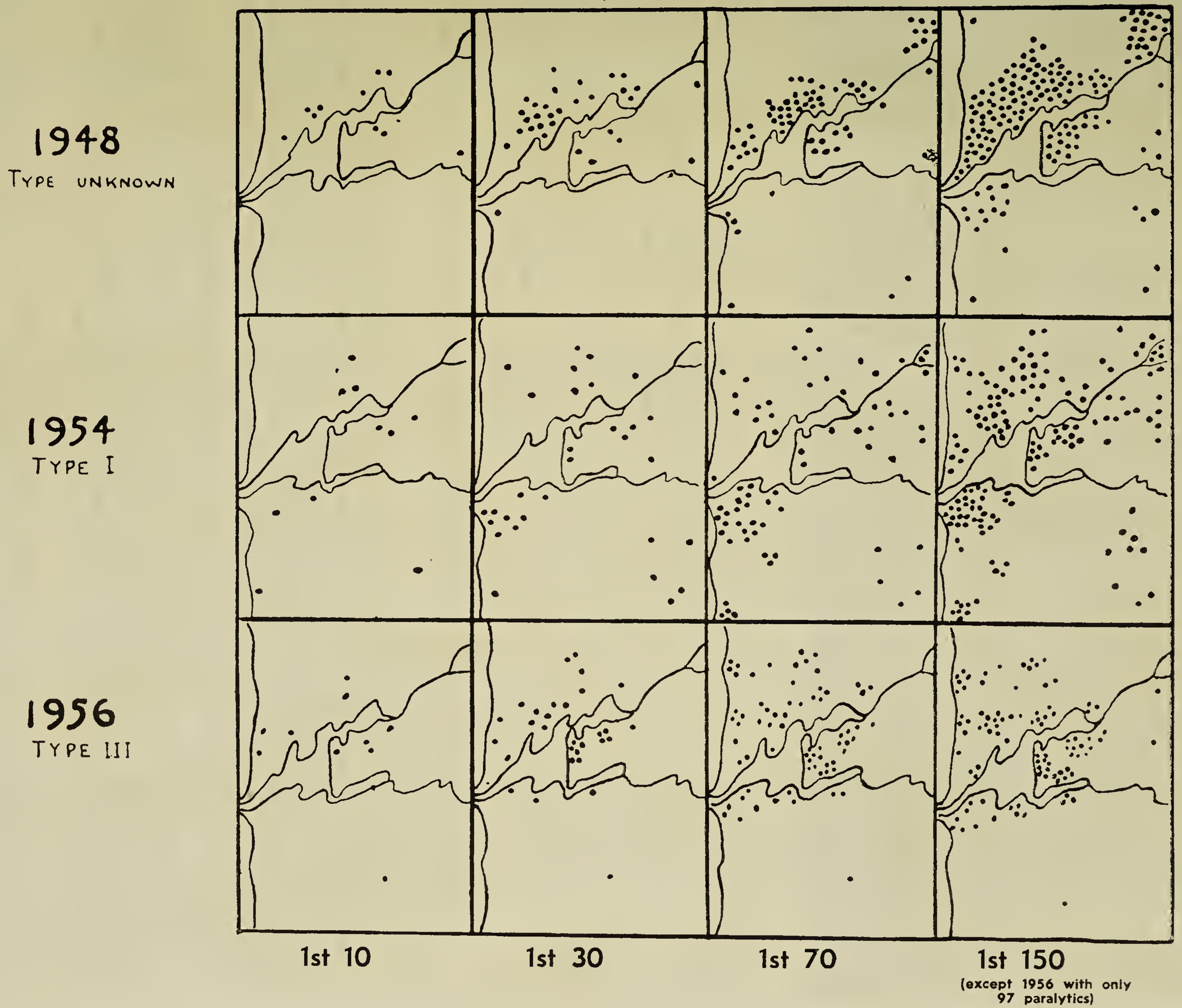
A Poliomyelitis Immunisation Unit was formed, consisting of four doctors, four driver-clinic attendants, two clerks, one typist, and two laboratory assistants ; while the Red Cross Society very kindly undertook to make available four voluntary aides for duty with the two metropolitan mobile clinics. The Unit was installed in part of the old Infant Health Centre at 13 Stirling Street, which required renovation and structural alterations. These premises were intended for use as an administrative headquarters, a central registry for records, a syringe-sterilization depot, and a special immunisation clinic.

The planning and construction of vehicles and equipment presented unusual problems, necessitating protracted discussion, experiment, and ingenuity.



POLIOMYELITIS: W.A. 1947-1956

SERIAL SPOT MAPS OF THREE POLIOMYELITIS EPEDMICS IN PERTH, WESTERN AUSTRALIA



The mobile clinics were to consist of caravans hitched to Bedford trucks. These caravans had to be specially designed and equipped with cold storage, washing and special sterilization facilities. Three were identical in pattern, and were constructed and equipped at a cost of approximately £1,000 each. The fourth, a much larger four-wheeled vehicle, was hastily completed during the epidemic, which preceded the Salk campaign. Its initial purpose was to transport cases of poliomyelitis with respiratory involvement from the country to Perth. It was probably instrumental in saving several lives, and when the epidemic abated it was converted into a mobile immunisation clinic. In addition to the vehicles, refrigerators for the vaccine had to be designed, ice-boxes were specially tested by experts under controlled conditions, the efficiency of the dry heat sterilizers was bacteriologically checked, and several small but important items of labour-saving equipment were invented.

Syringes and needles were the subject of special consideration. A separate needle was to be used for each child and a separate syringe for each ten children. Syringes and needles were to be cleaned mechanically after use, checked for defects, and sterilized by dry heat at 160° C. for a minimum of one hour. A copper-chrome syringe and needle carrier (sufficient for 100 inoculations) was invented and specially trained laboratory personnel were seconded to the Unit to operate a Central Sterilization Depot under the supervision of the Bacteriologist. The initial equipment for this purpose included 60 carriers, 800 syringes, and 16,000 needles.

The number of immunisations carried out by the end of 1956 (when the campaign had been in progress for six months), is indicated in the accompanying table. Almost exactly half of all West Australian children (97,660) had by that time received their first two doses of vaccine, together with 10,763 others which included school children over the age of 15 years, expectant mothers, nurses, young doctors, and certain personnel at special risk.

Salk Vaccinations (2nd July-31st December).

Age Group.	Population (1954 Census).	Two Doses.	One Dose only.	Total Doses.
0– 4	74,978	26,785	7,341	60,911
5– 9	67,079	40,028	91	80,147
10–14	52,693	30,847	....	61,694
	194,750	97,660	7,432	202,752
15–19	....	4,936	106	9,978
20 +	....	5,827	782	12,436
	....	108,423	8,320	225,166

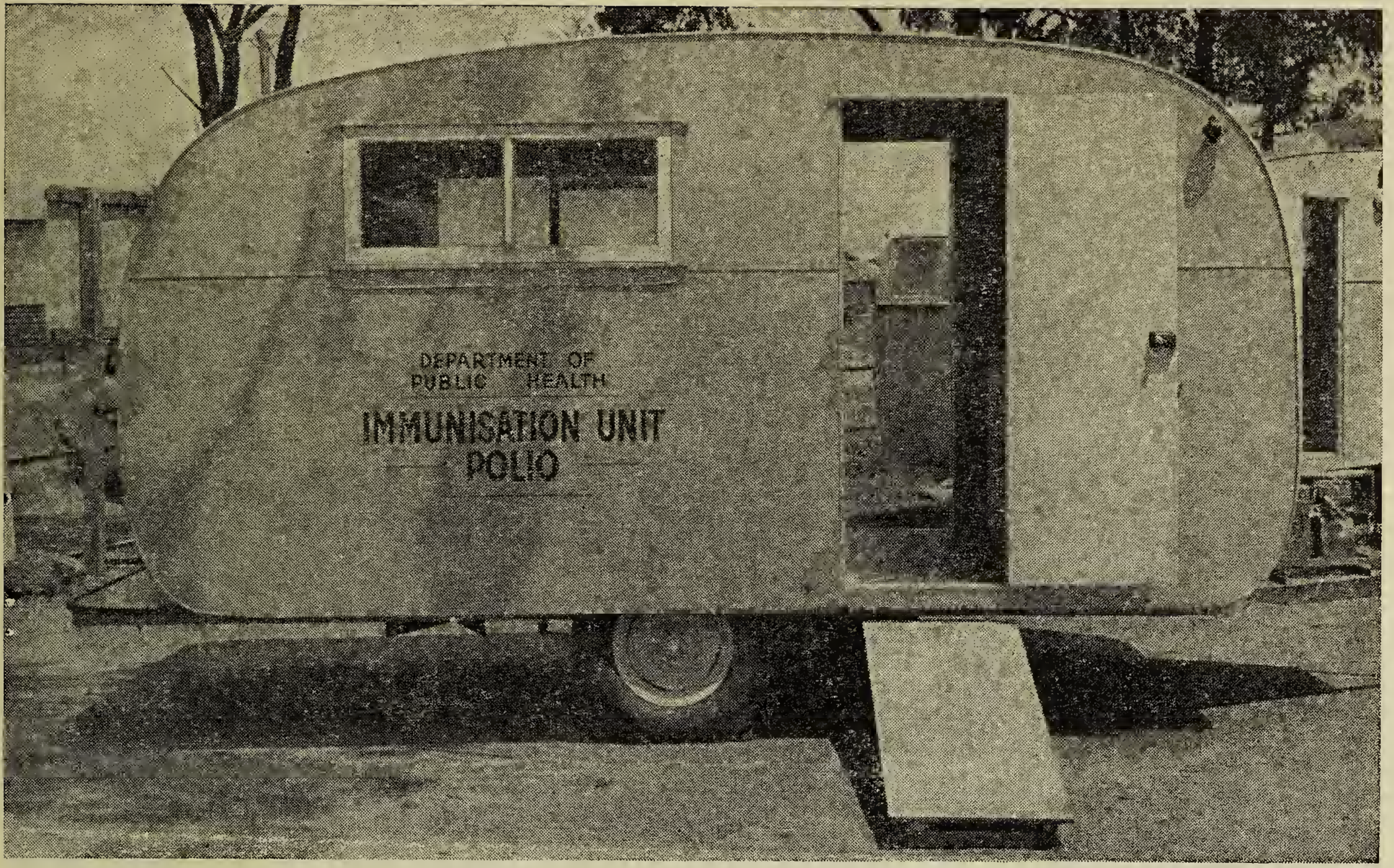
Note.—Eleven third injections were also given to Americans who had received their first two doses either in the United States or Hawaii.

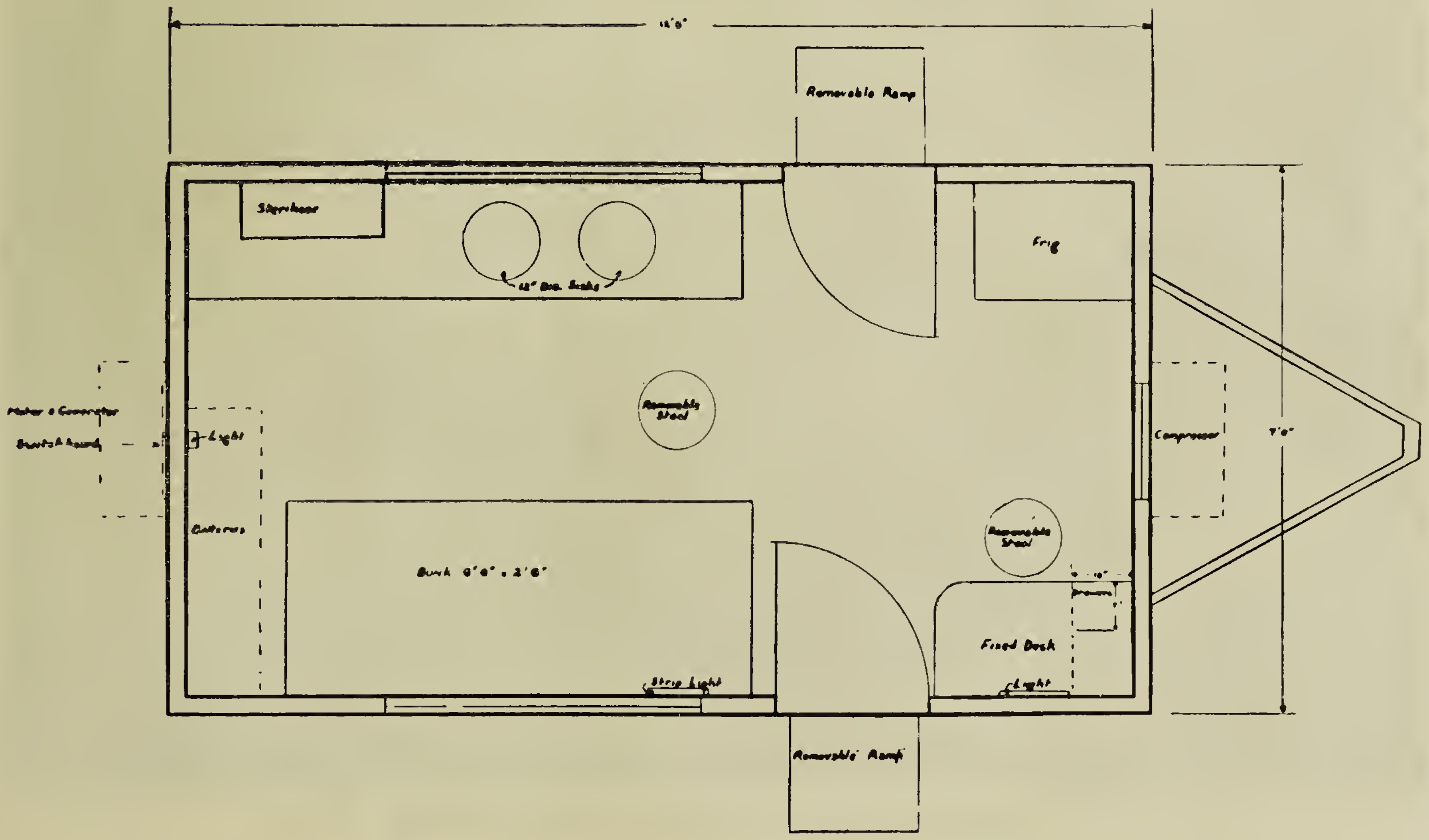
The prevalence of poliomyelitis during the six months of 1956 subsequent to the commencement of the immunisation campaign was the lowest since poliomyelitis first became a major problem in 1948. Only two cases of paralytic poliomyelitis were recorded, and neither of these had been immunised with Salk vaccine. This exceptionally low prevalence might well have been a coincidence associated with the usual lull which follows an epidemic, and the full impact of vaccination upon prevalence of the disease will not be evident until at least the end of 1957. Nevertheless, the preliminary indications are most gratifying, and warrant the greatest confidence.

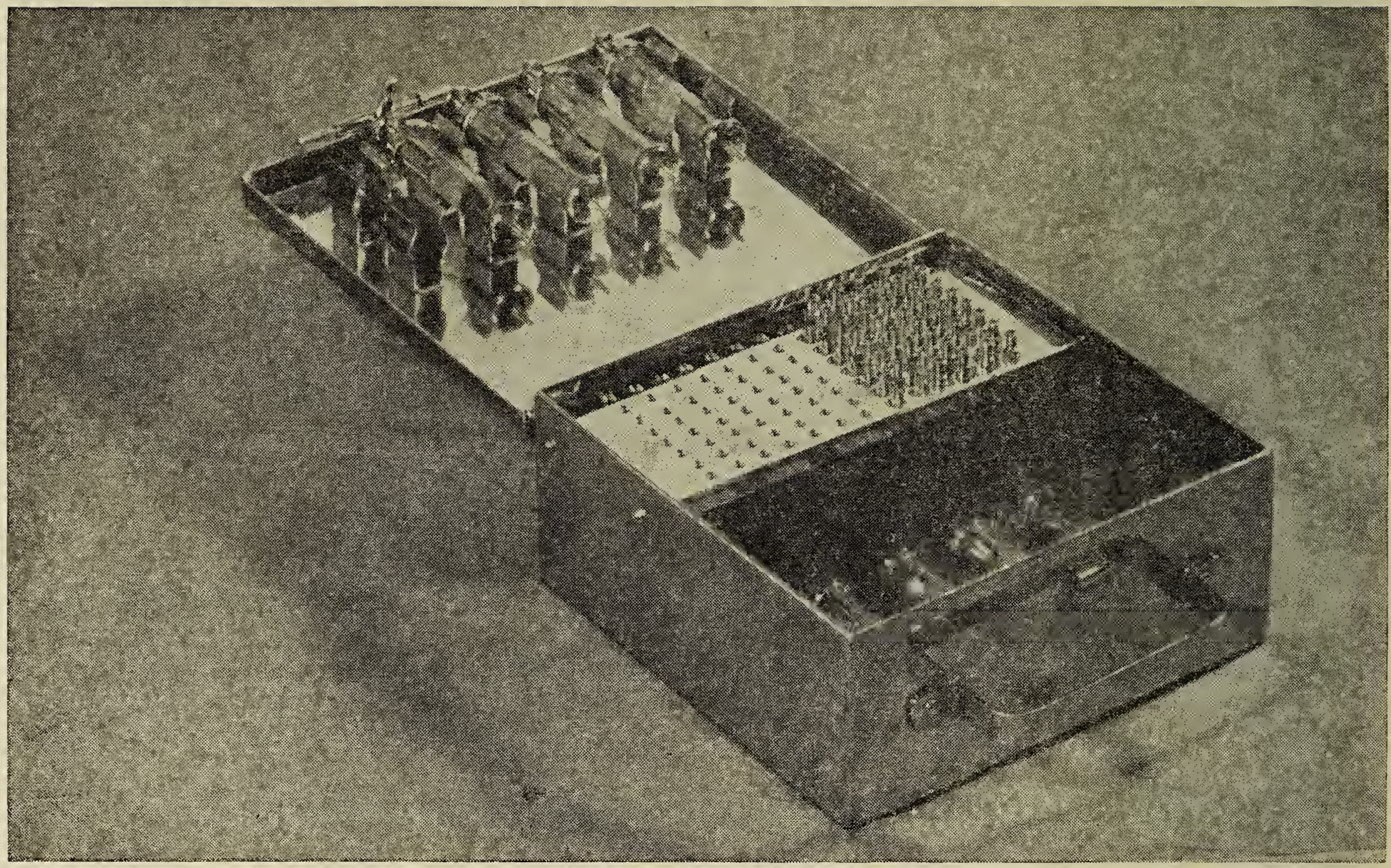
No reactions of major significance were encountered among 225,166 separate inoculations administered by the end of the year. A number of unusual transitory rashes were notified early in the campaign, and these were investigated. It appeared that their occurrence was coincidental and not directly attributed to the vaccine. Only in one instance, an expectant mother with an allergic dermatitis, was there some suggestive association with the vaccine, but even in this case the evidence was inconclusive.

The co-operation of several departments, organisations, authorities, and individuals has been a most gratifying feature of the campaign. The assistance of the Director and officers of the Education Department is especially noteworthy ; while the Infant Health Section, Local Health Authorities, Parents and Citizens' organisations, the Red Cross Society, and the Public Works Department have all contributed significantly to the smooth and successful execution of the project, and the Lotteries Commission was generous enough to provide funds for the issue of sweets to certain categories of children.

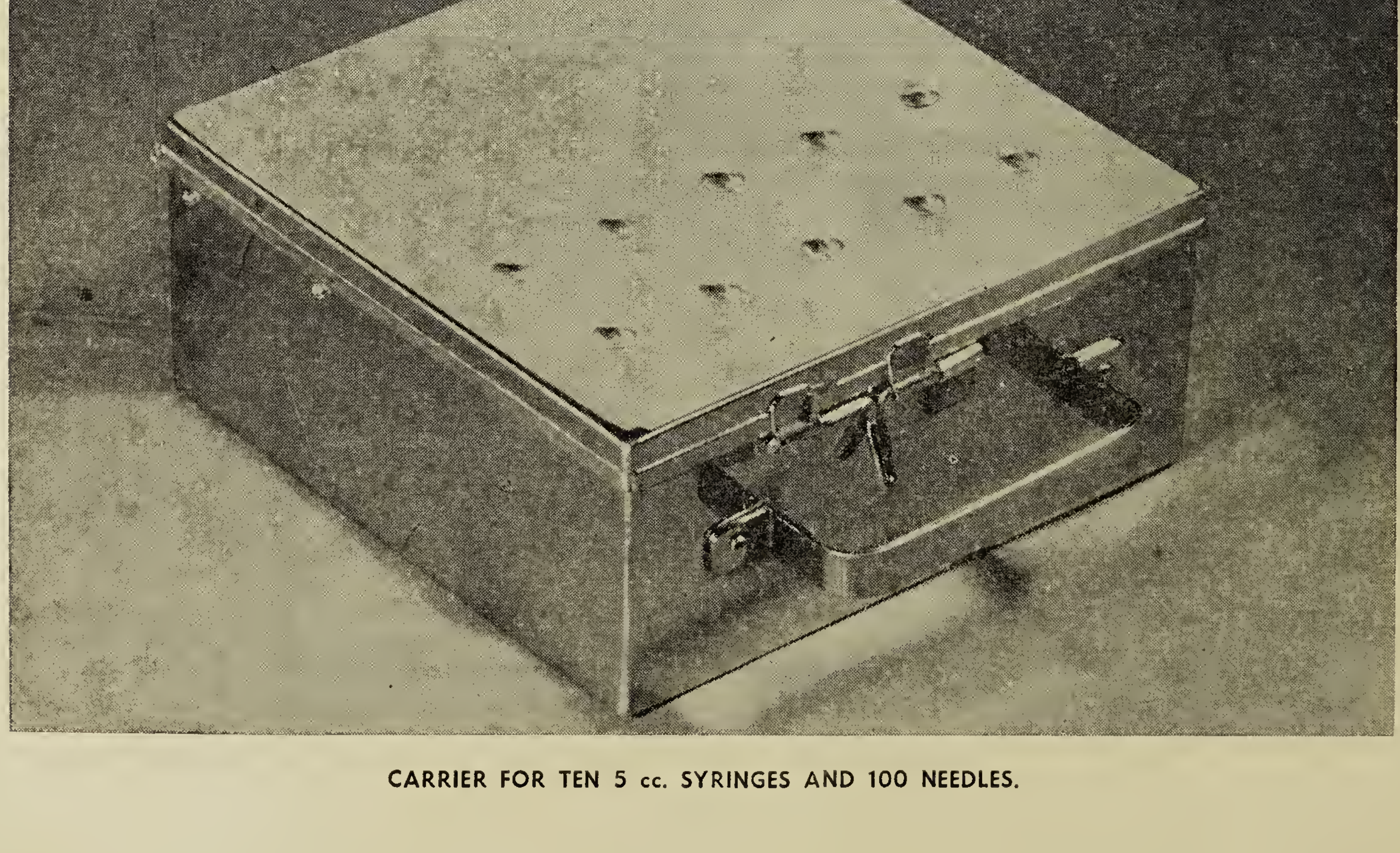
To sum up, the first phase of the poliomyelitis immunisation campaign has been executed according to plan, and will be continued at maximum speed until the bulk of the community has been protected. About 97 per cent. of all West Australians under the age of 15 years will have received two doses before the middle of 1957 and the majority will have completed the full course of three injections by the end of that year. Extended immunisation has coincided with a remarkable drop in the incidence of poliomyelitis, and the indications are that the conquest of this diease is well advanced.


DEPARTMENT OF
PUBLIC HEALTH
IMMUNISATION UNIT
POLIO


12'0"
Removable Ramp
Steriliser
12" Dia. Sinks
Frig
Motor & Generator
Switchboard
Light
Removable Stool
Compressor
7'0"
Batteries
Bunk 6'0" x 2'6"
Removable Stool
10"
Drawers
Fixed Desk
Strip Light
Light
Removable Ramp



CARRIER FOR TEN 5 cc. SYRINGES AND 100 NEEDLES.



CARRIER FOR TEN 5 cc. SYRINGES AND 100 NEEDLES.

DIPHTHERIA : AN OUTBREAK OF " CONTACT-POSITIVES "

The suburb of Rivervale, with a high immunisation rate, had been free from diphtheria for the 6 months preceding May 8, 1956, when an " unimmunised " child aged 4 years developed diphtheria. The five other members of the family were swabbed and two were found to be positive (a brother and sister who had received full basic immunisation followed by a " booster " injection six years previously). These two children were admitted to hospital as " carriers ".

On May 22 another child in the district developed the disease. She had been inoculated eight years previously, and had also received a " booster ". All the six household contacts were swabbed and found to be clear ; but of ten other contacts five were positive.

There were no further local developments until August 10, when a third child showed clinical signs of the disease. She had been immunised five years previously. The five other members of her family were negative, but of 17 other contacts three were positive.

On September 11 a fourth child, inoculated against the disease five years previously, developed diphtheria. The six other members of her family were negative.

Thus over a period of four months, four cases of diphtheria had occurred in the district ; and of these one had been regarded as fully immunised, two had received the basic course five years previously but had missed their boosters, and only one could be regarded as completely unprotected. Swabbing of the 22 household contacts of these four cases had disclosed only two positives, but of 27 other contacts eight were positive.

The disclosure of this relatively large number of " contact-positives " (ten in association with four cases), together with the observation that nearly all of them were aged ten and eleven years, led the local authorities to suspect the presence of a chronic carrier in that age group at the local school. They accordingly swabbed 128 school children aged 10 and 11 years, and nine positives were found. The close associates of these were identified and swabbed and a further 12 positives discovered. Mass swabbing was then extended to four other classes, and from 180 children 13 more positives emerged. This comprehensive swabbing of children at the school thus resulted in the disclosure of no less than 34 positives (11 per cent.) out of 308 children. All these positive children were admitted to hospital and carefully re-examined. A few had minimal clinical lesions, and the great majority had no signs of disease but were treated with antibiotics and antitoxin.

The immunisation histories of all 44 " contact-positives" were re-investigated, and it was confirmed that only 7 had never been immunised (four adults, one schoolchild, and two infants). The remaining 37 had received a basic course of immunisation 1–12 years previously ; no less than 19 had been " boosted " ½–2 years previously, and a further 6 some 4–7 years previously. Ten had missed their boosters and two had received booster injections one day and one week prior to the taking of their swabs. One twelve year-old positive had received his basic immunisation in infancy and had had no less than three boosters—six years, three years, and one year previously. Another, an eight year-old had been immunised in infancy and had had boosters six and two years previously.

The significance of these observations could well be the subject of an interesting discussion elsewhere. At the time, however, it seemed that the disclosure of so many contact-positives among " immunised " children was of little practical value in controlling spread of the infection. Far from disclosing significant " sources of infection " it appeared to be obscuring the issue and further swabbing seemed pointless. There was already sufficient evidence of widespread infection with little actual disease in a highly immunised child community. Only those who were inadequately immunised would be at real risk. The indications were to immunise those children as yet unimmunised and to reinforce the immunity of all others with all possible speed.

On the recommendation of the Department therefore, further swabbing was discontinued by the Local Authority. Two Immunisation Units were detached from Salk Vaccine duties, and transferred to the area. Their presence was publicised through the radio and the press ; and a loud speaker van toured the district urging parents to have their children inoculated. In two afternoons 2,000 children were injected by these emergency units, while several hundred were inoculated elsewhere. No further cases were notified from the area.

Commentary

This episode provokes several comments :—

1. Providing that a sensitive culture medium is used a large number of symptomless infections can be demonstrated in association with clinical diphtheria.

2. Active artificial immunisation is the best known safeguard against diphtheria, but while preventing disease it does not prevent infection.

3. In a substantially immunised community, diphtheria is rare, but unsuspected symptomless infections are probably common.

4. Routine contact swabbing should not be extended beyond the household involved.

5. In attempting to control an outbreak, or threatened outbreak of diphtheria, maximum immunisation is the first and the main, if not the only, measure indicated.

After-note.—Several of the strains recovered were tested for virulence and found to be pathogenic to laboratory animals ; and 18 out of 20 sent to the Epidemiological Research Unit at Fairfield Hospital, Melbourne, were identified as C. *diphtheria mitis type Johnson.*

INFLUENZA " A ": AN OUTBREAK IN A COUNTRY TOWN

With the onset of winter in 1956 the usual increase in the incidence of upper respiratory tract infections was encountered in Perth and elsewhere. Many of these infections were clinically indistinguishable from influenza. Increasing numbers occurred throughout July, and by August reports suggested the presence of a mild epidemic of the disease.

Early in October, however, the head teacher of the school at Corrigin (town population : approximately 1,000) notified the absence with influenza of 80 out of the school's 240 pupils. Because of the explosive nature of this secondary outbreak, and the opportunity of collecting unusual information, arrangements were made for a medical officer to visit Corrigin. He found that although the outbreak had been preceded by several adult cases, it had mainly involved children. The clinical features of the disease were consistent with influenza of mild-to-average severity, but some 20–30 had been admitted to hospital. There had been no deaths and no remarkable complications.

Throat washings and paired sera were obtained from selected cases and flown to the Commonwealth Serum Laboratories, Melbourne, where they were examined by Dr. L. C. Rowan. Type "A" virus was isolated from four specimens after the inoculation of embryonated eggs. This virus, after further examination at the World Influenza Centre in London, was found to be closely allied to the new " Dutch 56 " antigenic group represented by A/Ned/36/56, which had appeared in February 1956, and had since been identified in several countries. Haemagglutination inhibition tests carried out on the sera showed titres rising from 1 in 20 to 1 in 80 or more when tested against several related strains of virus.

This episode is of almost historical significance, for it represents the first occasion on which an influenza virus has been isolated from West Australian material. The knowledge gained is of little practical significance at the present time, but adds to the information being collected by the World Health Organisation with the object of controlling a potentially dangerous epidemic disease.

THE MOSQUITO SURVEY

In a previous Annual Report (1953) attention was drawn to the need for more information about insects of medical importance in Western Australia ; and to the advantages that would accrue from an entomological survey to disclose particularly the types and distribution of mosquitoes throughout the State.

Arrangements were made accordingly, and during 1953–54 the northern part of the State was investigated (Hodgkin and Britten). A number of potential vectors of malaria were identified including *A. annulipes, A. amictus hilli, A. amictus amictus,* and *A. bancrofti bancrofti* ; but the more important *A. punctulatus farauti* was not found. Ten different species of *Culex* and seven species of *Aedes* mosquitoes were also collected.

During the period 1954–56 the survey was extended southwards through the rest of Western Australia, and the detailed findings are recorded elsewhere (Britten). *A. annulipes* was found to be widespread and *A. atratipes* confined to the south-west corner of the State. Six species of *Culex* and 19 species of *Aedes* were recovered. These include five previously described but unnamed, and one hitherto undescribed species (provisionally referred to as *Aedes* sp. " Koorda ").

This survey has been a prolonged and arduous task, but has produced useful results. It has confirmed the absence of the more notorious insect-transmitters of disease in the State, but has disclosed the presence of several potential vectors ; while the significance of certain other species is not yet known. Above all it has rectified a major deficiency in local knowledge, provided data which will be of interest to entomologists all over Australia, and contributed to the advancement of disease prevention.

HEALTH EDUCATION : ITS VALUE IN CONTROLLING INFECTIOUS DISEASES

The establishment of a Health Education Organisation has already been of great assistance in controlling infectious disease. It played a major part in securing a Salk Vaccine acceptance rate of 97 per cent. among school children (a figure which must be regarded as a maximum in any democratic community), and will therefore have contributed substantially to the control of poliomyelitis.

During the Rivervale diphtheria episode, which involved a great deal of local alarm, Health Education officers did much through the press and radio to restore confidence, and organised urgent and effective publicity for the special immunisation clinics conducted in the area.

Of the other campaigns undertaken by this organisation, fly control and improved food handling must contribute to a reduction in the prevalence of the intestinal diseases with which the community is plagued particularly during the summer.

Finally, the standard leaflets on immunisation and allied subjects which have been prepared and distributed to local health authorities and the public will be of constant and increasing value in the control of communicable diseases. So far as the epidemiological field is concerned, the Health Education Council and its officers have fulfilled all expectations, and their continued activity will be an important additional safeguard against disease.

AN EPIDEMIC OF POLYARTHRITIS OF UNKNOWN AETIOLOGY

The following is an extract of some notes made on February 20, 1956 ; which have now acquired special significance because of published reports of similar experiences in Victoria and South Australia (Med. Jour. Aust., July 27, 1957).

" Clinicians during the last few weeks have reported the prevalence of a syndrome which does not conform with any descriptions of the better known diseases. Its cardinal features are polyarthritis of a few days' duration and a transient maculo-popular rash of unusual type. Although cases have been encountered in Perth, most seem to have occurred outside the metropolitan area as virtual outbreaks in several country towns.

" There is a gradual onset with malaise, headache, feverishness, vague muscle pains, and pains in the joints. Both large and small joints are involved and swelling of these commonly follows. A maculopapular rash of bizarre type often occurs, but fades and disappears in a day or two. In some patients tenderness and enlargement of lymph glands has been seen, but there has been no splenic enlargement. Some patients complain of unusual sensations in the tips of the fingers and soles of the feet. Symptoms usually subside in a few days, but in some instances the illness has lasted for three or four weeks.

" Most of these patients have been treated with salicylates, but the effect has been uncertain, and one or two have been severe enough to warrant consideration of cortisone. Haematological investigations have been inconclusive.

" Although groups of 30–40 cases have been seen over a period of 3–4 weeks in several country towns, familial cases have not been noted and there is no good evidence indicating transmission from person to person.

" Inquiries from practitioners indicate that prevalence has now practically subsided and it is probably too late for a special investigation, but a recurrence next summer will warrant this."

Representative practitioners were approached accordingly, but the disease was not reported during the rest of the year.

Appendix VIIa.

A SURVEY OF THE MOSQUITO FAUNA OF THE SOUTHERN PARTS OF WESTERN AUSTRALIA.

By

E. J. Britten, M.R.S.H.

DEPARTMENT OF PUBLIC HEALTH, WESTERN AUSTRALIA.

In a previous report (Hodgkin and Britten, 1955), mosquitoes encountered during a survey of the tropical or northern parts of the State were described. At the instigation and under the general direction of Dr. D. J. R. Snow, Director of Epidemiology, a survey covering the remainder of Western Australia has now been carried out and the results are described in the present report. The essential purpose was to determine the species of mosquitoes present and their distribution, with special reference to those capable of transmitting disease.

The territory under investigation was divided into eight zones, and each zone was surveyed separately. In addition, special supplementary surveys were undertaken in the vicinity of Onslow and in the Leonora area because of unseasonal heavy rains ; and the opportunity was seized while returning overland from leave in the Eastern States to collect specimens along the Eyre Highway.

As many sites as possible within each zone were visited, and larval specimens were collected from a wide variety of locations including rivers, billabongs, swamps, rock-holes, road-side pools, drains, and rain-water tanks. While attention was concentrated on larvae, adult mosquitoes were caught whenever seen to be attacking, and at other times when found resting in the vicinity of obvious breeding places.

Wherever doubt existed as to the identity of particular larvae, attempts were made to breed out adults. A number of such specimens, including some not adequately described in available literature, were referred for final identification to Dr. E. P. Hodgkin, Mr. D. J. Lee, or Dr. E. N. Marks.

ZONE 1. GERALDTON-NORTHAMPTON-MORAWA : APRIL and MAY, 1955

The only anopheline mosquito identified was *A. annulipes.* It was by far the most prevalent of all the mosquito species seen and occurred more or less throughout the area. Larvae were found breeding in a wide range of locations which included small muddy pools, roadside potholes, slow moving brackish water in creeks, clear water in the upper reaches of the Irwin River, large open expanses of shallow water with reeds.

Nine other species were collected in the zone. They included *Aedes tremula, Aedes alboannulatus, Aedes sagax, Aedes camptorhynchus, Aedes occidentalis, Culex fatigans, Culex pipiens australicus, Culex annulirostris,* and *Culex fraudatrix* ?

Adult *A. tremula* were caught at a dam in company with *A. alboannulatus,* and specimens of the latter species were bred out from pupae taken at the same location. Larvae of *A. sagax* were found in muddy salt water thirty miles from Geraldton, and in turbid fresh water at a railway culvert and a creek near Mullewa. Larvae of *A. camptorhynchus* were recovered from dark stagnant water in the Greenough River bed and from small open salty pools in the vicinity where they were in great abundance. They were also found in roadside drains not far from Geraldton and Mullewa.

A. alboannulatus group were widely prevalent. Larvae were found in a muddy pool at Winchester, in open water in the Irwin area, and in widespread shallow water overlying a cane grass flat near Nabawa. Near Northampton these larvae were recovered from pools in a creek bed, at Ellendale from clear rock pools, and in the Morawa and Carnamah area from stagnant water in rock holes.

C. fatigans were found widely scattered over the entire zone. Adults were caught in rooms and larvae were found breeding in rain-water tanks, stagnant water in river beds, and waste water from settlements. It was the main rain-water tank breeder in the zone.

C. pipiens australicus and *C. annulirostris* were found together in the Irwin River and in various mud-holes overgrown with grass. The former was particularly common throughout the zone and outnumbered all other species with the exception of *A. annulipes.* In general the larvae of these two *Culex* mosquitoes appeared to favour stagnant semi-permanent collections of water containing grass, algae, and debris. Larvae of *C. fraudatrix* ? were found only at one location—a creek of clear running water near the highway a few miles south of Northampton.

ZONE 2. MOORE RIVER, HILL RIVER, WONGAN HILLS, GOOMALLING: JULY, 1955.

The only anopheline mosquito identified was *A. annulipes*, which was distributed consistently throughout the zone although not always in any great numbers.

Larvae were collected in a wide variety of water such as saline creeks near Moora, and fresh, clear, grassy pools at Gingin, Hill River and Goomalling.

These larvae were more plentiful in fresh water containing much algae and vegetation.

Thirteen other species were collected ; these were *Tripteroides atripes, Culex fatigans, Culex pipiens australicus, Aedes sagax, Aedes camptorhynchus, Aedes alboannulatus* group, *Aedes bancroftianus, Aedes clelandi, Aedes notoscriptus, Aedes occidentalis, Aedes* sp. "Ratcliffe's No. 1," and *Aedes* sp. "Ratcliffe's No. 8."

The *A. clelandi* and the two last named species were adults in a batch obtained by an army unit (Malaria Control Unit, Western Command) in the Lancelin Lakes area and identified by Dr. Marks.

Members of the *A. alboannulatus* group were the most prevalent of all mosquitoes found in the zone and were collected in all areas visited and in various types of water ; but particularly in clear, fresh, grassy ground pools such as were found at Gingin, Hill River, Dalwallinu and Goomalling.

A. bancroftianus larvae were confined to the Moora district where they were found mainly in the many clear saline creek bed pools ; they were also found in clear fresh water. In one instance, in a fresh water earth dam where there existed much grass and weed, larvae were abundant.

A. occidentalis, the identification of which was confirmed by adults bred from larvae, were collected exclusively from rock pools in granite outcrops in the inland country between Dalwallinu and Goomalling.

A. sagax larvae were collected in fresh water in the Hill River area, and near Goomalling, where adults were also caught biting in the shade in daylight. Adults were also caught near Moora.

A. camptorhynchus were collected in the larval stage in saline water at Gingin and in the Moora area Adults were caught at Goomalling.

A. notoscriptus larvae were found to be plentiful in Moora in rain-water tanks, but were not found elsewhere in the zone.

T. atripes was another rain-water tank breeder which was confined to one town only, that being Goomalling.

C. fatigans larvae were collected from rain-water tanks, septic tanks and in several instances fresh water soaks throughout the zone. It was more prevalent than all the other species which breed in artificial containers.

C. pipiens australicus larvae were found in a variety of waters consistently throughout the zone, but appeared to favour fresh clear, grassy, pools.

An adult *C. annulirostris* was caught biting in daylight near Goomalling. No larvae of the species were found in the zone at the time of the survey. On January 28th, 1957, some larvae were collected near Moora.

ZONE 3. MUCHEA, YORK, CORRIGIN TO ROCKINGHAM : JUNE-JULY, 1956.

Two species of *Anopheles* were identified, *A. annulipes* and *A. atratipes.*

A. annulipes was found consistently throughout the zone in saline water, such as the Avon River at Northam and the river flats at York, but in most cases the larvae of this species were found in fresh water pools and soaks amongst grass algae and reeds.

A. atratipes was collected only at Yanchep. Adults were caught biting in daylight in the shade, and larvae were found in clear, fresh, grassy water.

Twelve other species of mosquitoes were identified, and at least two more could not be recognised from literature available.

Those identified included *Aedes alboannulatus* group, *Aedes occidentalis, Aedes sagax, Aedes camptorhynchus, Aedes australis, Aedes notoscriptus, Aedes clelandi, Culex fatigans, Culex pipiens australicus, Culex annulirostris, Theobaldia atra, Triperoides atripes.*

The rainfall in this zone for the months of June and July was above average in most centres, and much fresh ground water was available.

A. alboannulatus group larvae were found to be the most numerous and widespread species, being found mostly in fresh, clear, grassy water, but also in saline water such as at Northam, in the Avon River and in the Grass Valley Brook.

A. occidentalis larvae were found in fresh, clear, open rock pools at Northam, Karragullen and Armadale.

A. sagax were collected from temporary, shallow, and in most cases turbid, pools in the Northam, York, Brookton and Corrigin areas.

A. camptorhynchus larvae were collected sparsely over a wide area and were confined to brackish water, except in one instance at Lake Coogee, where they were found in fresh water pools in association with *A. annulipes* and *A. alboannulatus.*

A. australis were confined to rock pools on the coast line at Triggs Island and Rockingham, where spray from the sea is able to replenish the water as it evaporates.

A. notoscriptus were found near Perth, then at Northam, York and Brookton only. As it is found mostly in rain-water tanks, it could have been missed in other areas owing to the fact that most tanks were overflowing at that time of the year.

A. clelandi larvae were collected in fresh, clear water at Muchea and Rockingham, and an adult was caught resting in the shade at Karragullen in daylight.

C. annulirostris were found in fresh, permanent collections of water throughout the metropolitan area in the drier parts of the year, *i.e.*, October to March, but were not prevalent when the survey was made in June and July ; in fact, no specimens were collected outside the metropolitan area in this zone.

C. pipiens australicus larvae were common in almost all centres visited, although not in any great numbers. They were found mostly in fresh, temporary to semi-permanent collections of water where grass and reeds were plentiful. An occasional specimen was collected from saline water, such as the Avon River at Northam and the river flats at York.

C. fatigans were found throughout the zone where rain-water tanks are commonly used, and where a septic installation is not properly treated or adequately screened. They were found to be more plentiful in Northam, York, Toodyay, Brookton and Corrigin.

C. " near " *fergusoni.* Larvae resembling *C. fergusoni* were collected in clear, fresh water along the coastal belt at Coogee, Rockingham, and inland as far as Serpentine.

Triperoides atripes were found in rain-water tanks in the metropolitan area and Wanneroo, and in great numbers at Toodyay, Northam, York, Brookton and Corrigin.

Theobaldia atra larvae were collected in the metropolitan area, Yanchep and the Toodyay area, in fresh, clear, grassy water, and in one instance, at Toodyay, were found in a covered well which had the water levels near the ground surface.

ZONE 4. HYDEN, LAKE KING, LAKE GRACE, WILLIAMS, HARVEY, WAROONA, BRUNSWICK : MARCH, 1955

Two species of anophelines were found in this zone, *A. annulipes* and *A. atratipes.* The former was found widespread throughout the zone, mostly in fresh water with algae or weed, but specimens were also collected from muddy pools and saline water, particularly in the Williams area, where they were plentiful.

One adult *A. atratipes* was caught biting in shade at 10.30 a.m. near the Drakesbrook Dam.

The 11 other species identified were *Aedes camptorhynchus, Aedes sagax, Aedes alboannulatus, Aedes occidentalis, Aedes notoscriptus, Aedes tremula, Aedes spinosipes, Culex fatigans, Culex pipiens australicus, Culex* " near " *fergusoni, Tripteroides atripes.*

Adult *A. sagax* were caught in many spots in the bush of the " Lakes Country " from Lake Carmody to Lake King, yet no larvae of the species were found. Some 8 inches of rain had fallen from February 15th to 17th, but most of the casual water had dried up by 21st March, when the survey was conducted. This species was also prevalent, particularly in the adult stage, at Williams, Narrogin, and Harvey.

One adult *A. camptorhynchus* was caught south-east of Narrogin on the Arthur River flats, but no larvae were found in the zone.

A. alboannulatus group larvae were found in fresh, grassy water in great numbers in the Harvey area around the irrigation channels and in the Williams area. Adult *A. alboannulatus* were collected in the same areas.

A. occidentalis adults were caught biting in the Hyden and Waroona areas.

A. notoscriptus adults were caught at Holt Rock. They attacked humans freely " at dusk " from 6.30 p.m. onwards, and again at 7 a.m. next morning. An extensive search failed to locate the breeding place. The area searched included nearby rain-water tanks, rock holes in the rock catchment area, and wells. The vegetation around the catchment was comparatively low scrub.

A. tremula adults were caught flying near the doorway of a farmhouse near Lake King, and *A. spinosipes* were also collected in the same situation. This latter species was also caught biting in a shaded position at 3 p.m., but no larvae were collected.

T. atripes. This species was found widespread throughout the zone in rain-water tanks. In the Williams and Narrogin areas they were very prevalent.

C. fatigans were found widespread throughout the area in rain-water tanks, septic tanks and other polluted as well as fresh water. In one instance in a swamp at Drakesbrook this species was found in countless numbers in a pool containing a dead animal.

C. pipiens australicus larvae were found in fresh grassy pools throughout the zone. They were more prevalent in the Williams area.

C. annulirostris were confined to the western parts of the zone from Williams towards the coast. They were found in the greatest numbers in the fresh water grassy pools around the irrigation drains in the Harvey district.

C. " near " *fergusoni* were found in the Harvey and Waroona areas, in fresh, clear water.

ZONE 5. SOUTH-WEST CORNER OF THE STATE BORDERED BY BUNBURY, DARKAN AND NORNALUP : MAY, 1956

Two species of *Anopheles* were identified from this zone. *A. annulipes* were found to be widespread throughout the zone, and although specimens were found mostly in fresh water, they were also taken from saline water such as in the Perup River near Perup.

A. atratipes, although not numerous, were collected in both adult and larval stages and were widespread throughout the zone. The larvae were restricted to sheltered, fresh water streams, pools and swamps with ample grass or weed. Adults were caught biting in daylight in shaded situations at Nornalup, Walpole and Pemberton.

Twelve other species were identified, comprising *Aedes camptorhynchus*, *Aedes alboannulatus* group, *Aedes occidentalis*, *Aedes notoscriptus*, *Aedes australis*, *Aedes clelandi*, *Culex fatigans*, *Culex pipiens australicus*, *Culex annulirostris*, *Culex* " near " *fergusoni*, *Tripteroides atripes*, *Theobaldia atra*.

A. alboannulatus group larvae were found to be numerous and widespread throughout the zone. They were collected mostly from fresh water which was plentiful at that time of the year. Adult *A. alboannulatus* bred from larvae in many cases, and in one instance *A. occidentalis* adults bred from a mixed collection of larvae from a fresh water creek bed pool near Bridgetown.

A. camptorhynchus were not prevalent in the larval stages, but adults were widespread and were caught biting in the scrub during the day. In the Nornalup area larvae were frequently found in fresh water.

A. notoscriptus adults were frequently found biting in timber country in the south-west portion of the zone, but larvae were found only twice in rain-water tanks. Larvae were again found in rain-water tanks at Donnybrook.

A. australis larvae were found in sea water rock pools in countless numbers, near the Leeuwin Lighthouse, and at Canal Rocks near Yallingup. In the thick scrub near Cape Leeuwin adults of this species were very numerous in the early evening.

A. clelandi were found in the Nornalup, Collie and Augusta areas, in fresh water pools containing grass and algae, and in fresh open clear water devoid of vegetation.

C. fatigans were collected from rain-water tanks throughout the zone. Adults were also collected emerging from an unscreened septic tank in the Collie district.

C. pipiens australicus were found to be widespread throughout the zone, though not numerous. In one instance, at Boyup Brook, this species was found in saline water, but mostly they were collected in fresh water grassy pools.

C. annulirostris were found in two places, only at Lake Muir and at Manjimup, both in fresh water pools containing grass and weed.

T. atripes were the most prevalent and widespread rain-water tank breeders in this zone.

T. atra were found to be widespread and fairly numerous in the wetter parts of the zone, where they were found in fresh water pools and streams, usually where there was ample shelter both above or near the water and in the water in the form of weeds, grass, etc.

ZONE 6. THIS ZONE COMPRISED THAT PART OF THE STATE BETWEEN WAGIN AND DUMBLEYUNG, THROUGH TO DENMARK AND ALBANY, 6TH TO 15TH AUGUST, 1956

During the previous month much rain had fallen in the zone and there was ample ground water about.

Anopheles annulipes larvae were present in the inland districts, but were not collected along the near coastal strip from Denmark to Albany, nor up in the Porongorup Range.

Anopheles atratipes larvae were collected in the Albany district only, and adults were also caught biting in daylight in scrub country near the Albany Rifle Range.

Of the other 15 species collected, three were identified by Dr. E. N. Marks as undescribed species of *Aedes*, the other 12 included *Culex fatigans*, *Culex pipiens australicus*, *Culex* " near " *fergusoni*, *Theobaldia atra*, *Tripteroides atripes*, *Aedes sagax*, *Aedes alboannulatus* group, *Aedes occidentalis*, *Aedes australis*, *Aedes camptorhynchus*, *Aedes bancroftianus* and *Aedes notoscriptus*.

C. " near " *fergusoni* were found to be plentiful in the Albany, Denmark and Mt. Barker areas where specimens were confined to fresh water containing abundant shelter in the form of grass, weeds or reeds.

C. pipiens australicus larvae were found to be widespread through the zone, and were collected mainly from fresh, grassy waters, but specimens were also taken from brackish water at Mt. Barker.

C. fatigans were found in the inland districts of Wagin and Gnowangerup in rain-water tanks. Of the other rain-water tank breeders, *T. atripes* were found only at Denmark, with *A. notoscriptus*.

A. sagax larvae were found in all areas in the Great Southern district from Wagin to Albany, and in to Gnowangerup, in fresh, temporary pools of water.

A. alboannulatus group larvae were by far the most prevalent and widespread, being found in all areas in the zone in clear to turbid, and fresh to saline waters. These larvae are, however, found mostly in fresh, clear waters.

A. occidentalis larvae were collected from rock pools on a granite outcrop near Wagin, and a shallow soak at Woodanilling. Identification was confirmed from adults bred from larvae. This species was not identified further south.

A. camptorhynchus larvae were found to be widspread throughout the zone, and were collected from brackish waters in creek beds and river flats. They were also collected from fresh water pools. Adults of the species were caught biting during the day, in the scrub, throughout the zone, particularly in the Albany area.

A. bancroftianus larvae were collected at Woodanilling in saline water in the Boyerine Creek. No other specimens of this species were found in the zone.

A. australis larvae were found only at Albany near the " Natural Bridge," both in sea water on the rocky coastline and in saline water on the cliff top.

Of the undescribed species, *Aedes* sp. " Ratcliffe's No. 1," was found in the Denmark, Albany, Porongorup and Gnowangerup areas in fresh water pools amongst weeds and reeds.

Aedes sp. " Ratcliffe's No. 7 " was collected along the Great Southern line from Woodanilling to Albany in small collections of fresh water such as a waterlogged rabbit warren, road culvert and roadside drain. In one instance larvae were recovered from a shallow winter swamp with abundant weed, grass and debris.

A. " Prom ? " larvae were found at Albany in several situations in fresh, clear water, and in one instance near Woodanilling in fresh water near an earth dam.

T. atra were found to be plentiful in the Albany and Denmark areas, and odd specimens were collected in fresh water in the Katanning, Tambellup and Porongorup areas.

ZONE 7. EASTERN WHEATBELT AREA : JULY, 1956

The only anopheline mosquito identified in this zone was *A. annulipes*, which was found to be widespread throughout the zone although not in any great numbers. In all cases this species was found in fresh water collections, mostly with grass and algae.

Besides one unidentified species of *Aedes*, the eight others included *Aedes alboannulatus, Aedes occidentalis, Aedes sagax, Aedes camptorhynchus, Aedes notoscriptus, Culex pipiens australicus* and *Tripteroides atripes.*

A. alboannulatus group larvae were the most widespread and prevalent of all species. They were found in most temporary fresh water ground pools, where flushing out by rain water was not regular, as well as the more permanent ground waters.

A. occidentalis were found in all except two cases in fresh water rock pools on large granite outcrops. They were found to be widespread throughout the zone.

A. sagax were not prevalent, but were found in fresh water pools over a large area. In one instance a single fourth-stage larva was found in a large salt lake at Hines Hill.

A. camptorhynchus were restricted to Dowerin, Bruce Rock and Merredin areas, where they were found in salt lakes, brackish and fresh water. Some of the waterways and river flats, which are normally salty, were at that time of the year mostly fresh owing to the excess rain. The *A. camptorhynchus* population might be greater when the salinity of the water is more normal.

A. notoscriptus larvae were found in two instances only, both in disused wells, one in the Wyalkatchem area and the other in the Bencubbin area. No specimens were collected from rain-water tanks.

T. atripes were found in rain-water tanks in Kellerberrin, Wyalkatchem and Mukinbudin only, but *C. fatigans* were found in them throughout the zone in large numbers. Larvae of *C. fatigans* were also discovered in foul water collections such as in Merredin in the area where the waste water from the Railway and Air Force Station accumulates.

C. pipiens australicus larvae were found to be prevalent and widespread through the area, mostly in fresh collections of water containing grass, weeds and reeds.

The unidentified species was declared by Dr. E. N. Marks to be a new undescribed species of *Aedes.* It was found over a wide area, as in a fresh water dam south of Merredin, a waterlogged rabbit warren at Merredin, a fresh water soak at Koorda, and a fresh water grassy pool at Bruce Rock.

ZONE 8. THIS ZONE INCLUDED THE SOUTH COASTAL STRIP FROM ONGERUP TO ESPERANCE, AND THE DRY INLAND AREA UP TO KALGOORLIE, THEN WEST TO BURRACOPPIN. IT INCLUDED A LARGE AREA OF SPARSELY POPULATED, DRY COUNTRY. THE SURVEY WAS RESTRICTED TO NEAR THE MAIN ROADS AND ACCESSIBLE SOAKS AND POOLS : AUGUST, 1956

Anopheles annulipes was the only species of anopheline mosquito identified in the zone. It was not very prevalent, and was found as far east as the Young River area, in fresh water grassy pools.

Apart from two unidentified species of *Aedes* the nine other mosquitoes found included *Aedes alboannulatus* group, *Aedes occidentalis, Aedes camptorhynchus, Aedes sagax, Aedes notoscriptus, Aedes alternans, Culex fatigans, Culex pipiens australicus, Tripteroides atripes.*

A. alboannulatus group, which are usually found in fresh water collections, were also found in saline water in the Young River area. They were found consistently throughout the zone, and were more numerous than any other species. Adults were caught biting in a number of situations during the daytime.

A. occidentalis were found in a rock pool two miles east of the No. 2 rabbit-proof fence, a shallow well in the Young River area, in rock pools on a granite outcrop near Gnarlbine Soak (22 miles south-west of Coolgardie), and in similar rock pools at Moorine Rock and Strawberry Rocks in the Yilgarn area.

A. camptorhynchus larvae were found to be prevalent along the coastal strip where many of the creeks and river pools are brackish. They were also caught in the adult stage during the day and early evening.

A. sagax were more prevalent in the coastal belt in the adult stage. They were caught biting readily in shaded situations during the day time. Larvae were also collected fairly consistently throughout the zone, but were not in any great numbers.

A. notoscriptus larvae were confined to rain-water tanks and artificial containers. They were collected at Esperance, Norseman and Kalgoorlie.

A. alternans. One specimen only in the larval stage was collected from a pothole in a fresh water creek bed leading from Depot Rocks, 22 miles south of Coolgardie.

C. fatigans larvae were collected from rain-water tanks from Esperance to Coolgardie, including Kalgoorlie. In the Esperance area they were found in some of the numerous shallow wells around the town.

C. pipiens australicus, although not numerous, were spread consistently throughout the zone, and were found in fresh water pools, etc. They were found to be plentiful in the several fresh water seepages to Lake Spence at Esperance.

T. atripes were confined to rain-water tanks in Norseman and Kalgoorlie.

EYRE HIGHWAY : DECEMBER, 1955

Owing to the dry state of the country collections were restricted to water catchments and tanks, both natural and artificial.

The only species of anopheline mosquito caught was *A. annulipes*, and these were confined to the water catchment at Newman's Rocks which are some 89 miles east of Norseman.

Five other species were collected. These were *Aedes notoscriptus*, *Aedes alboannulatus* group, *Aedes occidentalis*, *Culex fatigans*, and *Culex pipiens australicus*.

A. notoscriptus larvae were found at Eucla in a rain-water tank and in a rock water catchment behind the motel at Madura. Adults were caught biting in the early evening two miles west of Balladonia and in the early morning at Newman's Rocks.

A. occidentalis adults were caught at the same times and situations as *A. notoscriptus*.

A. alboannulatus group larvae were found in the rock catchment tank at Madura.

C. fatigans larvae were collected from a rain-water tank at Eucla.

C. pipiens australicus were found 91 miles west of Eucla in the Wigunda underground catchment tank, in the Cocklebiddy tank and in the rock catchment at Newman's Rocks.

LEONORA AREA : 5th TO 7th JUNE, 1956

In the Leonora area 169 points of rain fell between the 21st to 23rd May, 1956. This was sufficient to leave many ground and creek bed pools, ideal for mosquito breeding. The object of the visit was an attempt to ascertain what species of mosquito made use of the early rains to breed out and cause a nuisance. The weather was cold, the minimum temperature being in the vicinity of 43 degrees and the maximum 65 degrees.

All temporary ground waters where larvae were found proved without exception to contain *Aedes sagax* in the 4th instar stage, and in many cases pupation and adult emergence had already taken place.

No anophelines were found during this visit to the area, but in May, 1954, *A. annulipes* larvae were collected at Station Creek, which is the site of the Leonora water supply.

A. sagax larvae were collected from fresh muddy pools in open clay pan country, fresh muddy creek bed pools, and similar fresh clear pools, over an area stretching from seven miles south of Menzies to ten miles north of Leonora. The breeding of this species was most prolific over the whole area.

C. fatigans larvae were found in rain-water tanks at Menzies, Leonora and Gwalia, while adults were caught resting inside an office at Leonora.

C. pipiens australicus larvae were found in a well near Leonora, and second instar larvae were found in association with fourth instar *A. sagax* in several situations such as a clear creek bed pool two miles east of Leonora, clear fresh water at Station Creek, and a large turbid creek bed pool five miles north of Leonora.

A. tremula larvae were found in a temporarily disused water supply well at Station Creek where the water was 20 feet from the surface.

T. atripes larvae were found in rain-water tanks at Leonora and Gwalia

ONSLOW AREA : JUNE, 1955

This special survey was undertaken as a result of exceptional rain in the area. The totals for the months of May and June were about 3½ inches for each month, which was about 270 per cent. above the average. Travelling was difficult on account of the boggy roads, and specimens were collected only from the more accessible localities.

The only anopheline mosquito found in the area was *A. annulipes,* which was one of the most widespread and prevalent mosquitoes collected. It was located in large permanent fresh pools such as the 10 Mile Pool, west of Minderoo in the Ashburton River, the Jabaddar Pool in the Cain River, and the Wogoola Pool, in roadside drains and pools of fresh turbid water and in one instance in a poultry watering tin at Yanrey Homestead.

C. pipiens australicus larvae were found as widespread and prevalent as *A. annulipes,* and in most instances they were found breeding in association with one another.

C. fatigans were confined to rain-water tanks at Onslow.

C. fraudatrix? larvae were collected from fresh side pools to the large Wogoola Pool near the Wogoola Homestead.

C. annulirostris larvae were found in fresh pools in the Cain and Yanrey Rivers.

C. " near " *fergusoni* larvae were located in fresh water pools in the Yanrey River, the Wogoola Pool and Cain River.

A. sagax adults were caught about 120 miles south of Onslow near Winning Pool, and near Jabaddar Pool in the Cain River, but no larvae were located.

A. vigilax adults were caught entering a dwelling and biting at Onslow in the early hours of the morning, while a brisk westerly breeze was blowing. No larvae could be found which might indicate the breeding ground.

A. pseudonormanensis larvae were found to be plentiful in turbid, fresh water pools in the Cain and Robe Rivers.

A. tremula were plentiful throughout the district both in the adult and larval stages. Larvae were found in various situations, such as in rain-water tanks at Onslow, tree holes at Minderoo and Yarraloola Station homesteads, a septic tank at Yanrey Station homestead, and a 35 ft. well near Barradale Crossing which is 80 miles south of Onslow.

NOTES ON SPECIES AND THEIR DISTRIBUTION

Anopheles

A. annulipes was collected over a very wide area from Onslow in the north to Esperance in the south, and extending inland to Newmans Rocks on the Eyre Highway and Leonora on the Goldfields. It was found breeding in various types of water, both clear to turbid, fresh to salty (Plates 1 and 4). In one instance at Yanrey, larvae of *annulipes* were collected from a watering tin in a poultry yard, while in another situation at Irwin the same species was found in clear open slowly moving water, the sodium chloride content of which was 1,117 grains per gallon. Although this species is known to breed in artificial containers and saline creeks and pools it appeared to have a preference for clear, fresh grassy pools with an abundance of algae and weeds or reeds.

The only other *Anopheles* collected was : *A. atratipes,* which was found as far north as Yanchep then along the south coastal belt as far as Albany and inland as far as Collie. This is generally a rare species, but is plentiful along the south, in the timber country of the Manjimup Road District, where it readily attacks man in the daytime, in shaded situations. The larvae in all instances were found in fresh water swamps and Creek beds thick with weeds or reeds.

Tripteroides

Only one species of *Tripteroides* was recovered. Larval and adult specimens were identified by Mr. D. J. Lee as *T. atripes.*

Culex

C. fraudatrix ? Larvae of this species were found in only two situations, both being north of Geraldton, one in the Northampton area and the other in the Upper Chapman District, one in slight saline slowly moving water amongst reeds and algae, and the other in open, fresh clear rock pools in a creek bed. The larvae resemble those of *C. fraudatrix* but until males are bred out the identity of this species must remain uncertain.

C. annulirostris. This species was found at Onslow, then in the Northampton district in as far as Mullewa, then spasmodically down the coastal belt to the south coast. It was not found further inland than Williams, about 70 miles from the coast, and it was not found in any great numbers. In most cases specimens were collected from fresh, open grassy pools.

C. pipiens australicus in the larval stage was the most prevalent and widespread mosquito found in the survey. It was found in all areas visited, which included Onslow, Laverton, and Madura on the Eyre Highway. Although it apparently prefers fresh, clear, grassy water, it was also found in stagnant and in saline waters (Plates 2, 3, 4 and 5).

C. fatigans was found as widespread as *C. pipiens australicus*, but because of its preferential breeding habitats it was not so prevalent, but is the main nuisance mosquito in rural towns.

Another species of *Culex* larvae which is referred to as sp. near *fergusoni* was collected as far north as Onslow and also along the near coastal strip from Perth around to Albany. It is a long siphoned larva closely resembling the published description of *C. fergusoni.* Numerous attempts have been made to breed out adults from the larval stage, using both natural temperatures back in Perth and also artificial heating, but without any positive results. These larvae are usually found in clear, fresh water pools or swamps. As noted below, these may be the larvae of *C. latus*, but specimens are no longer available for checking.

Aedes.

A. alboannulatus, which includes those larvae positively identified by breeding out adults, adults caught, and those identified only as *A. albannulatus* group was the most prevalent mosquito found in the area south of Northampton and as far east as Esperance to Coolgardie. It apparently adapts itself to varying types of water, although seems to prefer fresh water pools (Plates 1-4 and 7). It bites readily during daylight in shaded situations in the bush, is particularly fierce in its attack at dusk out of doors, and gradually disappears as darkness falls.

A species with similar larvae, *A. occidentalis* is found more inland in rock pools on top of large granite outcrops which appear throughout the southern portion of the State (Plate 8).

On some large outcrops where rock pools are numerous *A. occidentalis* could be found in one or two pools only, yet others contained larvae of *A. alboannulatus.* It was then noted that pools containing *A. occidentalis* larvae were those through which no water drained ; they were filled by rainfall only and not by drainage from higher up. It could be that the eggs are deposited in the " dry " rock holes and hatch out when rain falls, and that the eggs or larvae could be washed out of those pools which receive drainage from other parts of the rocks.

In a few cases *A. occidentalis* larvae were collected from shallow wells or soaks, mainly where winter rains kept the water level near the ground surface.

A. occidentalis were found as far east as Madura on the Eyre Highway but were not found further north than Perenjori.

A. camptorhynchus. The larvae of this species were found from as far north as Northampton, right through the wetter parts of the State round to Esperance. It was particularly numerous in the belt of country from Broomehill through Ongerup to Esperance. Adults of this species were caught biting in shaded situations during daylight, often far from obvious breeding places. Although this species apparently prefers brackish water, it was often found breeding in fresh water.

A. vigilax was found in Onslow in the adult stage, biting inside a dwelling at 1 a.m., and although a search was made in all likely places no larvae were seen. The only other area where *A. vigilax* was found is along the Swan River foreshore of the metropolitan area, where both larvae and adults were collected. The water in this instance, where larvae were found, was quite salty.

A. sagax. The only specimen of this species found near Onslow was one adult. It was further found widespread throughout the State from Mullewa to Esperance and as far inland as Laverton and the Warburton Ranges. Normally only a few specimens were collected over a wide area, but in the dry areas, right after rain, this species predominated, as previously mentioned in the Leonora area, and was found in great numbers.

In Zone 1, 14 miles south of Mullewa in casual turbid water, fourth instar larvae of *A. sagax* were found where rain had fallen only six (6) days before. Larvae, at the second instar stage, of *C. pipiens austraoicus* were also found in the same water. These conditions occurred in other situations also. Because of its speed of development the situation in which it is usually found is fresh turbid casual waters (Plates 1-5 and 6). In the wetter areas the larvae were found in fresh clear water. When *sagax* larvae were found in brackish water they were very few in number.

A. pseudonormanensis larvae were collected from river bed pools in the Onslow area from the Cain and Robe Rivers, and no specimens were found any further south.

A. bancroftianus. Larvae of this species were found to be very prevalent in the Moora District in fresh to brackish water. Further specimens were found in brackish water at Woodanilling.

A. australis (= *concolor*). This species was found along the coast at Triggs Island, Rockingham, Cape Leeuwin, Canal Rocks, Albany, and Esperance. In June, 1950, when at Pelsart Island in the Abrolhos Group, I collected larvae of *A. australis* from rock pools near the beach. Adults, which could have been *A. Australis*, appeared to be plentiful in the evenings, but even though they buzzed around they did not bite freely and did not enter buildings. No other species of larvae were found on the Island. In all cases but one where *A. australis* larvae were found, sea water had access to the pools at some stage, the exception being near Natural Bridge, Albany, where salt content of the water could only be caused by fine spray from the rocks below in rough weather. Larvae of *A. asworthi* can not be distinguished from *A. australis* and it is possible this species was included in some of the above samples.

A. notoscriptus. Larvae of this species were found in rain water tanks over a wide area, but not in any great numbers, and only at 15 points between Geraldton and Nornalup and east as far as Kalgoorlie and Madura. In the timber country in the southern part of the State adult *notoscriptus* were caught biting in daylight in situations well away from dwellings.

A. spinosipes. Two adults only of this species were found, one near Lake King, which was caught biting at 6·30 a.m., and the other was caught biting at 3 p.m. near Newdegate. No larvae of this species were found.

A. alternans. Single larva of this species was found at Depot Rocks, about 22 miles south of Coolgardie, in a fresh water creek bed pool and in association with *A. alboannulatus* group and *C. pipiens australicus.*

A. tremula. Adult specimens only of this mosquito were caught at Lake Grace and Geraldton, and larvae were found in a well on the Leonora water reserve. Both adults and larvae were collected in the Onslow area in various situations, *e.g.*, rain-water tanks in Onslow, a tree hole in Poinciana at Minderoo Station, and a septic system at Yanrey Station.

Theobaldia.

Species of this genus were collected along the coastal belt of the south-west portion of the State, from Yanchep to Albany. Adults bred from larvae have been identified as *T. atra.* They appear to prefer clear, fresh, grassy pools, and some specimens have been collected from wells which have a high water level. The larvae of this species will be described in due course by Dr. E. P. Hodgkin and the author.

The following mosquitoes have been identified by Dr. E. N. Marks.

Culex latus.

This specimen was collected at Albany. Larva referred to in this report as " near "*fergusoni* may well prove to belong to this species.

Aedes clelandi.

This species was collected from as far north as Lancelin, down along the coastal belt to Albany.

Aedes sp. " Ratcliffe's No. 1."

The above were found in the Lancelin area, Denmark, Albany and the Porongorups.

Aedes sp. " Ratcliffe's No. 7."

This mosquito was found more inland in the Great Southern District between Brookton and Cranbrook.

Aedes sp. " Ratcliffe's No. 8."

Adults of this species were collected from the Lancelin area and Albany.

Aedes sp. " Marks No. 71."

This species was found in the dryer areas in three widely separated situations, Onslow, Coolgardie and Leonora. It occurs also in Western Queensland.

Aedes sp. " Koorda."

This species also was collected in the dryer areas of Koorda, Bruce Rock, Coolgardie, Merredin, Wyalkatchem, and Moorine Rock. This is apparently a new species (Plate 4).

Aedes sp. " Prom ? "

A large larva from Albany and Woodanilling, possibly the same species as an undescribed Victorian larva.

SUMMARY

A survey covering the sub-tropical portion of Western Australia has disclosed the presence of two species of *Anopheles* mosquitoes (*A. annulipes* and *A. atratipes*). The former was most prevalent throughout the area, but the latter was confined to the wetter south-west corner of the State.

Six species of *Culex* (the most prevalent and widespread being *C. pipiens australicus*), were found, also one species of *Tripteroides* (*T. atripes*) and one species of *Theobaldia* (*T. atra*).

Nineteen species of *Aedes* were collected (the most prevalent being *A. alboannulatus*). These comprised 13 described species, five previously known but as yet unnamed, and one new species discovered in the present investigation. This last is a member of the subgenus *Ochlerotatus* and is referred to in this paper as *Aedes* sp. " Koorda," specimens of both adults and larvae having first been collected in the vicinity of the small country town of Koorda in W.A. The male of one, and larvae of two of the other undescribed species were also first collected during these surveys. These species are being investigated further and will be fully described by Dr. Marks in due course.

ACKNOWLEDGMENT

I wish to record my thanks to Dr. D. J. R. Snow, Director of Epidemiology, Department of Public Health, W.A., for his kindly direction and generous help, particularly in the compilation and editing of this report.

To Dr. E. P. Hodgkin, Reader in Entomology, Department of Zoology, University of Western Australia, for his constant guidance, encouragement and help in identification.

To Mr. D. J. Lee of the School of Public Health and Tropical Medicine, Sydney, for his help, guidance and time given to identification, and to Dr. Elizabeth N. Marks, Department of Entomology, University of Queensland, for her help and advice as well as the supply of literature, prompt identification, and checking of this report.

Further, I wish to acknowledge the help I received from the many interested people throughout the country during the survey, to the Army (Western Command, Malaria Control Unit) for their assistance and loan of specimens, and to Mr. A. C. Waldon, Department of Public Health, for his co-operation in producing maps and charts for this report.

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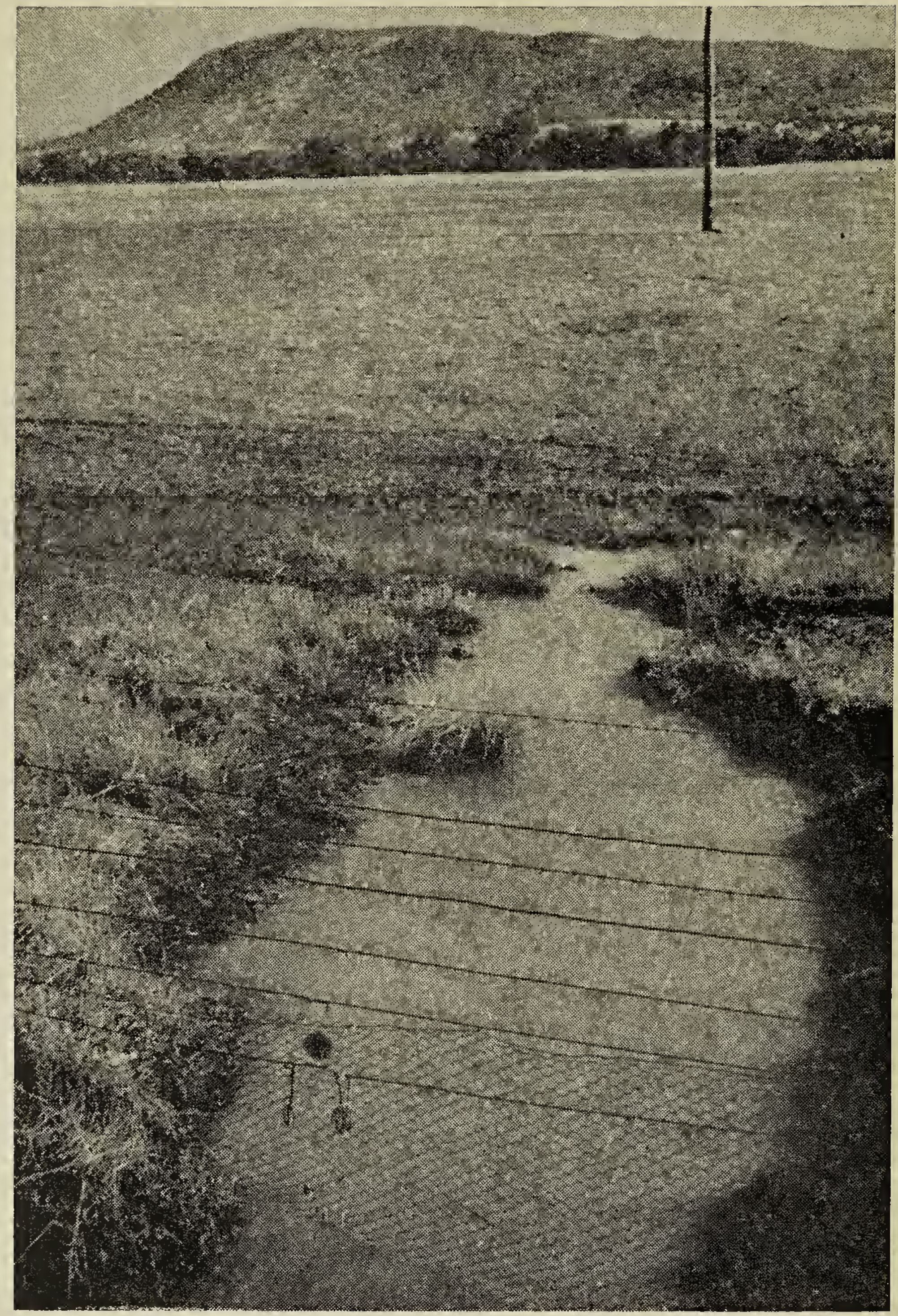
DISTRIBUTION OF MOSQUITOES FOUND

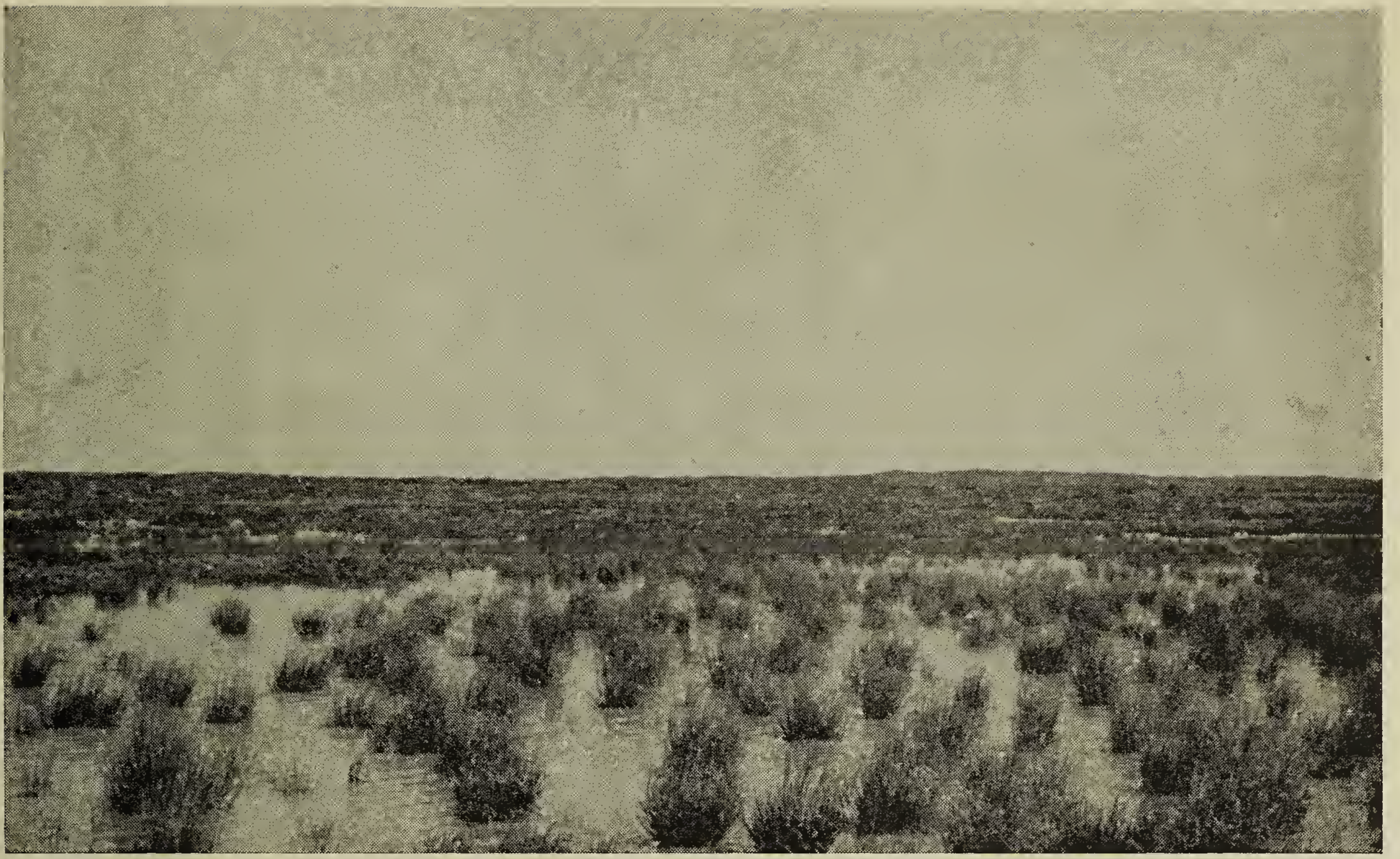
	Anopheles, annulipes	Anopheles, atratipes	Tripteroides atripes	Aedes (O) sagax	Aedes (O) pseudonormanensis	Aedes (O) camptorhynchus	Aedes (O) vigilax	Aedes (O) clelandi	Aedes (P) bancroftianus	Aedes (P) australis	Aedes (F) occidentalis	Aedes (F) alboannulatus group	Aedes (F) notoscriptus	Aedes (C) spinosipes	Aedes (M) tremula	Aedes (m) alternans	Culex (L) fraudatrix?	Culex (C) fatigans	Culex (C) pipiens Australicus	Culex (C) annulirostris	Culex latus	Culex near fergusoni	Theobaldia (C) atra	Aedes sp. " Ratcliffe's No. 8 "	Aedes sp. " Ratcliffe's No. 7 "	Aedes sp. " Ratcliffe's No. 1 "	Aedes sp. " Koorda "	Aedes sp. " Marks 71 "	Aedes sp. " Prom "
Albany		+	+	+		+		+		+		+						+	+		+	+	+	+		+			+
Armadale-Kelmscott	+							+			+	+							+										
Ashburton	+			+	+		+								+				+	+		+							
Augusta-Margaret River	+	+	+							+		+						+											
Balingup	+											+							+				+						
Belmont	+					+	+					+						+	+	+									
Beverley												+																	
Bridgetown	+		+								+	+							+	+			+						
Brookton	+		+	+		+						+	+					+	+					+					
Bruce Rock	+					+					+	+						+									+		
Bunbury						+						+																	
Carnamah	+					+						+						+	+										
Chittering	+			+				+				+																+	
Collie		+	+									+																	
Coolgardie				+							+	+				+											+		
Corrigin	+		+	+														+	+										
Cranbrook				+		+						+												+					
Dalwallinu	+											+						+	+										
Dandaragan	+			+								+							+										
Dardanup												+																	
Denmark			+			+		+				+	+									+	+			+			
Dowerin	+					+						+						+	+										
Drakesbrook	+	+									+							+		+		+							
Dundas	+		+	+							+	+	+					+	+										
Esperance	+			+		+				+	+	+						+	+										
Fremantle	+					+						+										+							
Gascoyne-Minilya	+																												
Geraldton-Greenough	+					+						+			+			+	+	+									
Gingin	+			+		+		+				+						+	+	+				+		+			
Gnowangerup	+			+		+					+	+						+											
Goomalling	+		+	+		+						+						+	+	+									
Greenbushes												+																	
Harvey	+		+	+								+						+	+	+		+							
Irwin	+			+								+						+	+	+									
Kalgoorlie			+										+					+											
Katanning	+			+		+													+										
Kellerberrin	+		+	+		+						+						+	+										
Kondinin	+			+							+							+	+										
Koorda	+										+	+							+								+		
Kulin			+								+		+					+	+										
Kununoppin-Trayning				+							+	+							+										
Lake Grace	+		+	+										+	+			+											
Laverton	+			+														+	+										
Leonora	+		+	+											+			+	+									+	
Manjimup	+	+	+			+		+				+	+					+	+	+		+	+						
Menzies				+														+											
Merredin	+			+							+	+						+	+								+		
Moora	+			+		+			+		+	+	+					+	+	+									
Morawa	+					+												+											
Mt. Marshall	+		+								+	+	+					+	+										
Mukinbudin											+	+							+										
Mullewa	+			+														+	+	+									
Murray	+											+							+	+		+							
Nannup		+										+																	

Narembeen	+										+	+						+	+										
Narrogin	+		+	+		+												+	+	+									
Northam	+		+								+	+	+					+	+					+					
Northampton	+					+						+					+	+	+	+									
Nungarin											+	+							+										
Onslow																												+	
Perenjori	+			+							+	+						+	+	+									
Perth	+						+					+	+					+	+	+									
Phillips River	+			+		+						+							+										
Plantagenet						+						+							+							+			
Preston	+												+						+										
Rockingham	+					+				+		+							+			+							
Roebourne																													
Serpentine-Jarrahdale	+							+				+							+			+	+						
Sussex	+					+				+		+																	
Swan	+							+				+							+				+						
Tambellup						+						+							+				+		+				
Tammin				+							+	+							+										
Three Springs	+																	+	+										
Toodyay	+		+									+						+	+					+					
Upper Blackwood	+		+									+						+	+				+						
Upper Chapman	+											+					+	+	+	+									
Victoria Plains	+								+			+						+	+										
Wagin	+					+					+	+						+	+										
Wandering	+																		+	+									
Wanneroo	+	+	+									+						+	+				+						
West Arthur	+		+			+						+																	
Williams	+			+								+							+	+									
Wiluna				+														+											
Wongan-Ballidu	+										+	+						+	+										
Woodanilling	+			+		+			+		+	+												+	+				+
Wyalkatchem			+								+	+						+									+		
Yilgarn				+							+	+						+									+	+	
York	+		+	+		+						+	+					+	+										



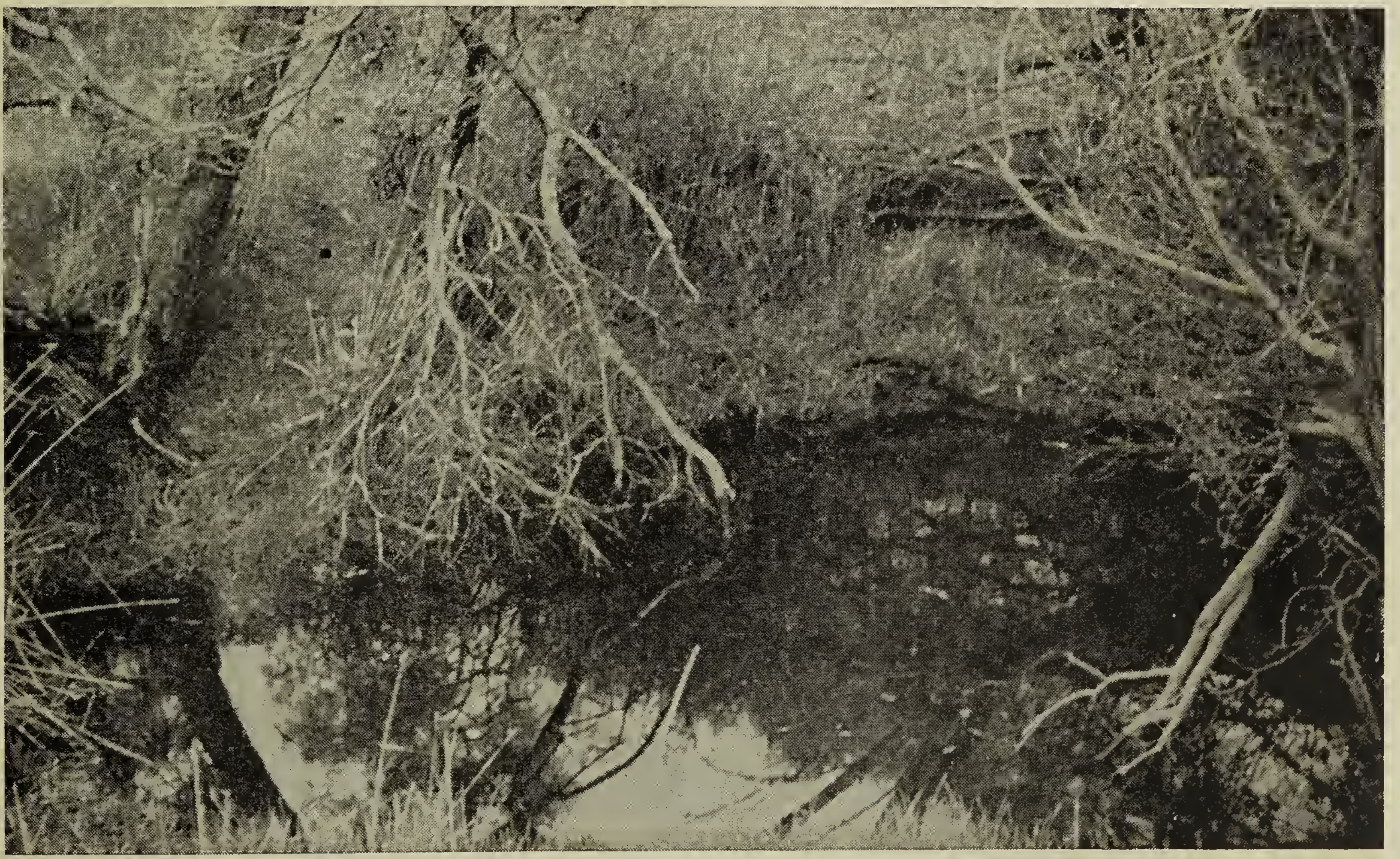
YORK – Road Culvert Pool. Fresh water
Anopheles annulipes — Aedes alboannulatus — Aedes sagax

WAGIN – Shallow storm water drain pools, typical habitat of
Culex pipiens australicus



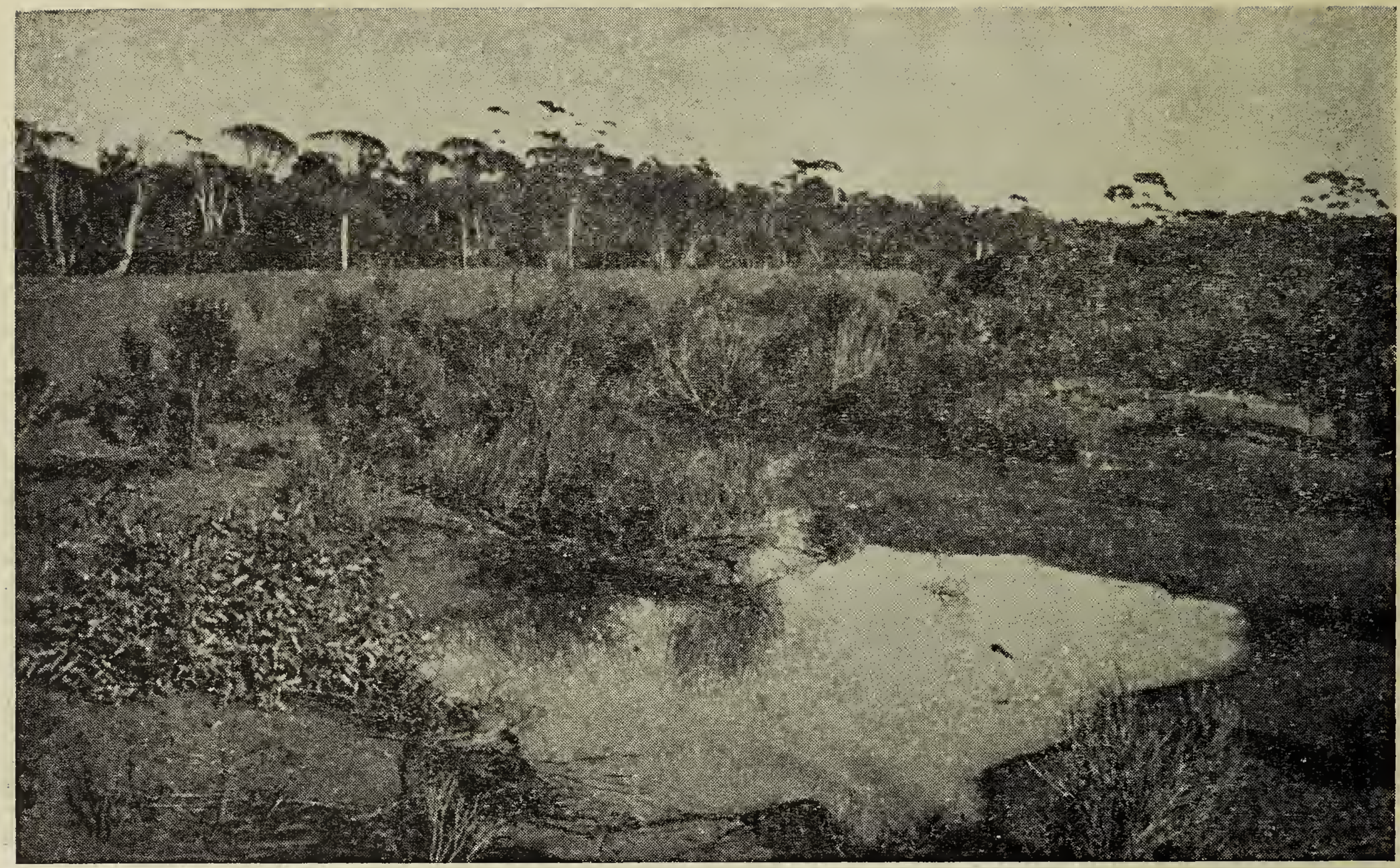
ONSLOW AREA – Shallow clay flats – fresh water

Culex pipiens australicus



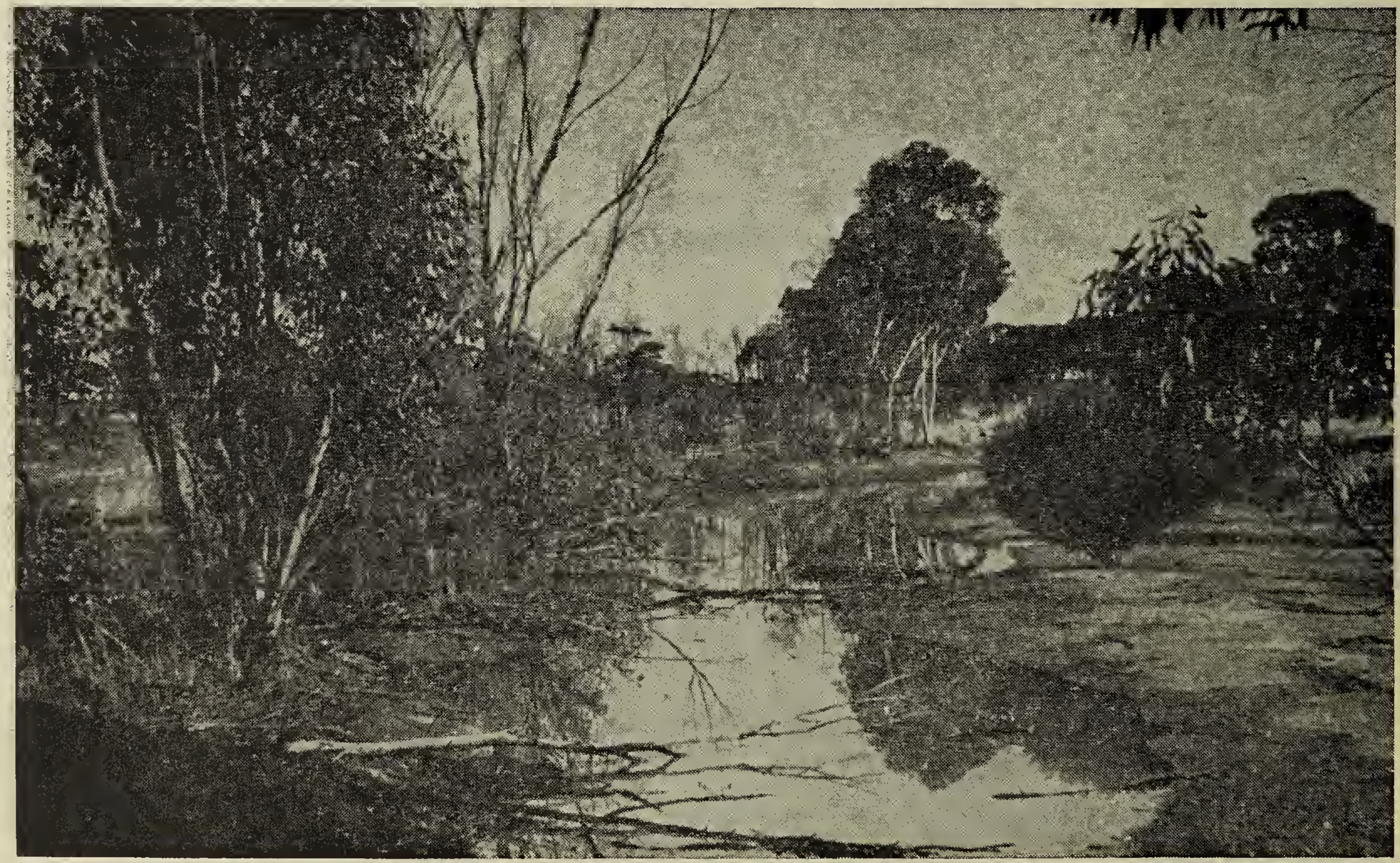
KOORDA AREA – Fresh water soak near Newcarlbine soak

Anopheles annualipes — Culex pipiens australicus — Aedes alboannulatus — Aedes sp. "Koorda"



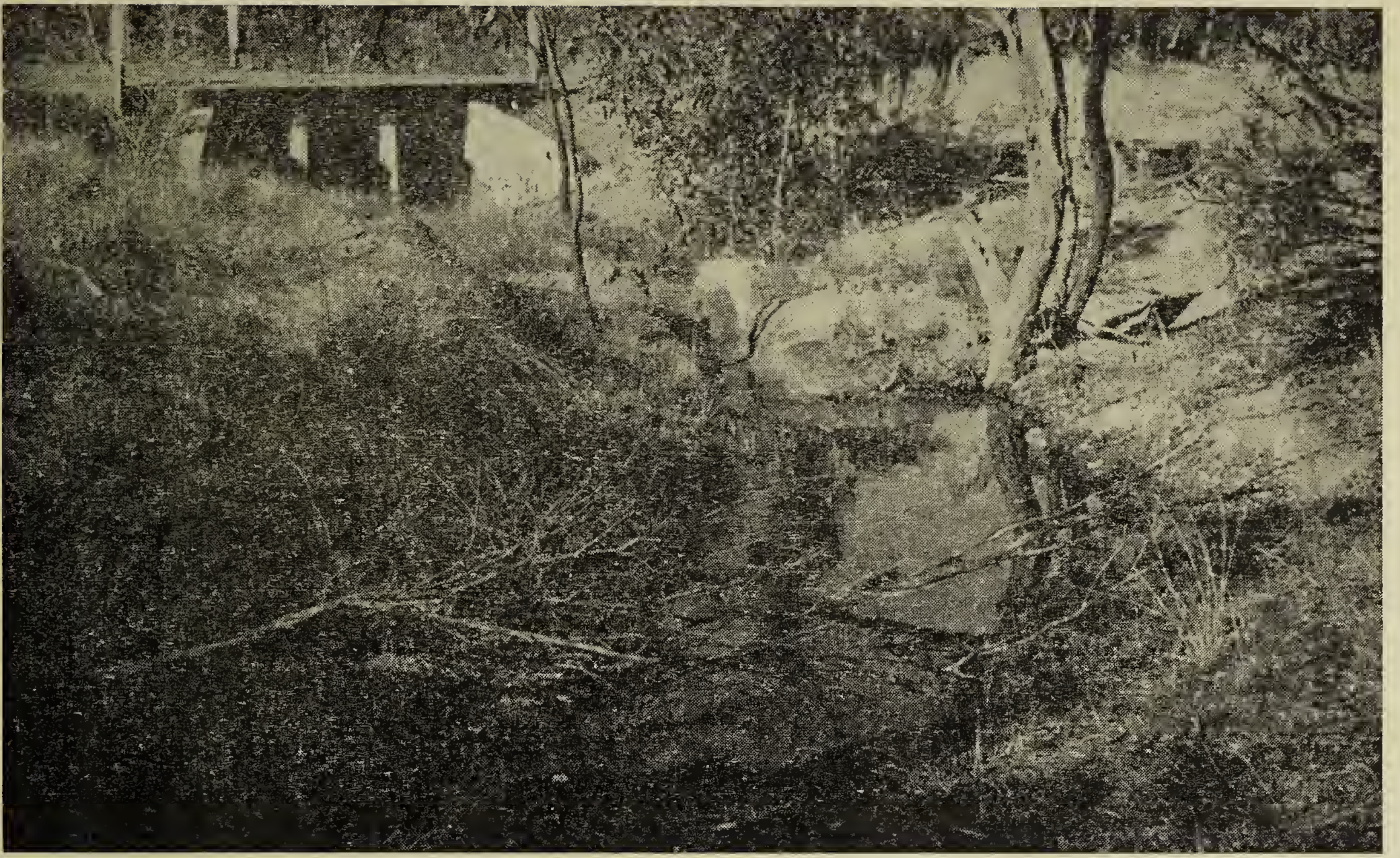
NORSEMAN – Muddy roadside pool

Aedes sagax — Culex pipiens australicus

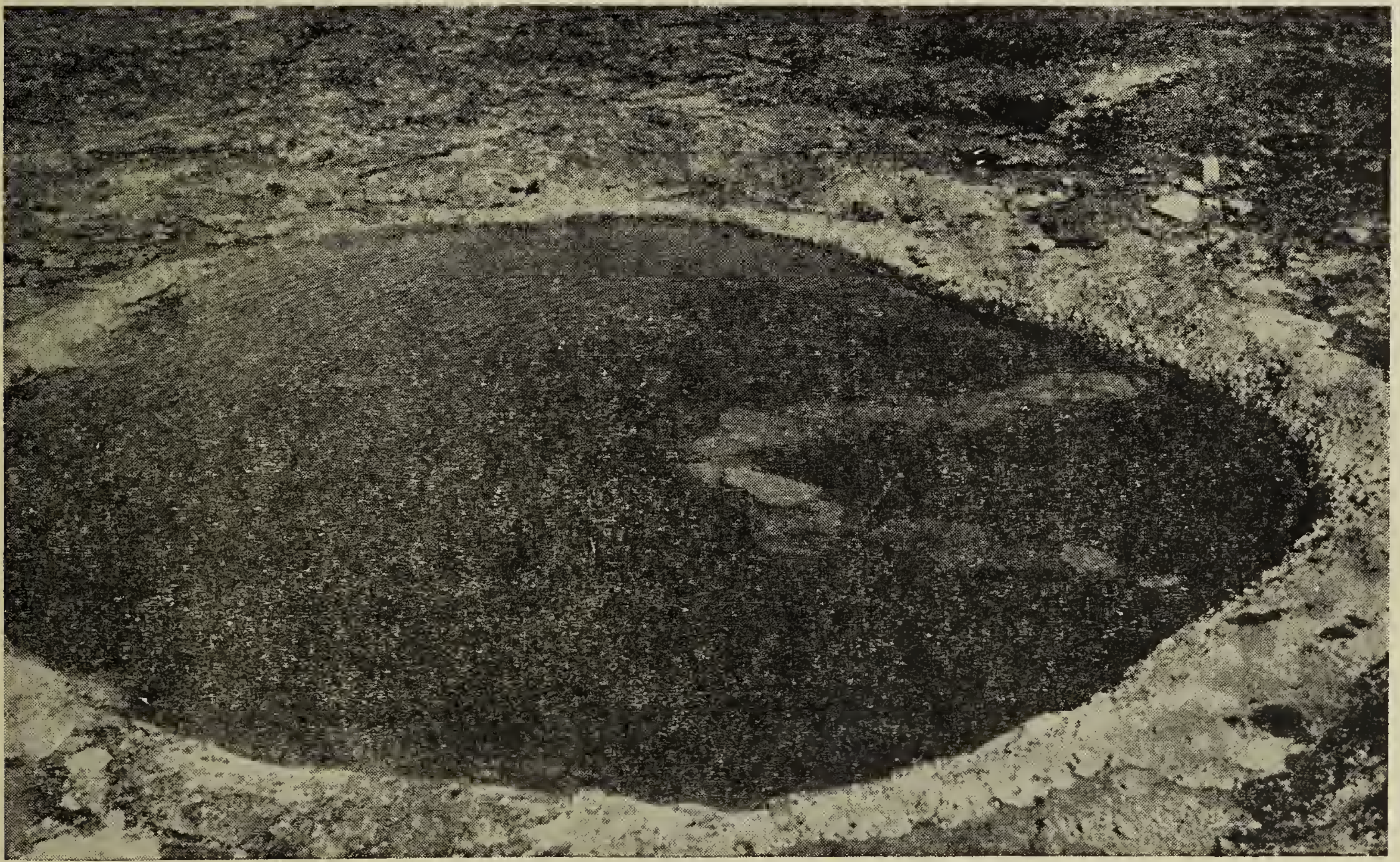


BURRACOPPIN AREA – Muddy roadside pool, typical habitat of

Aedes sagax

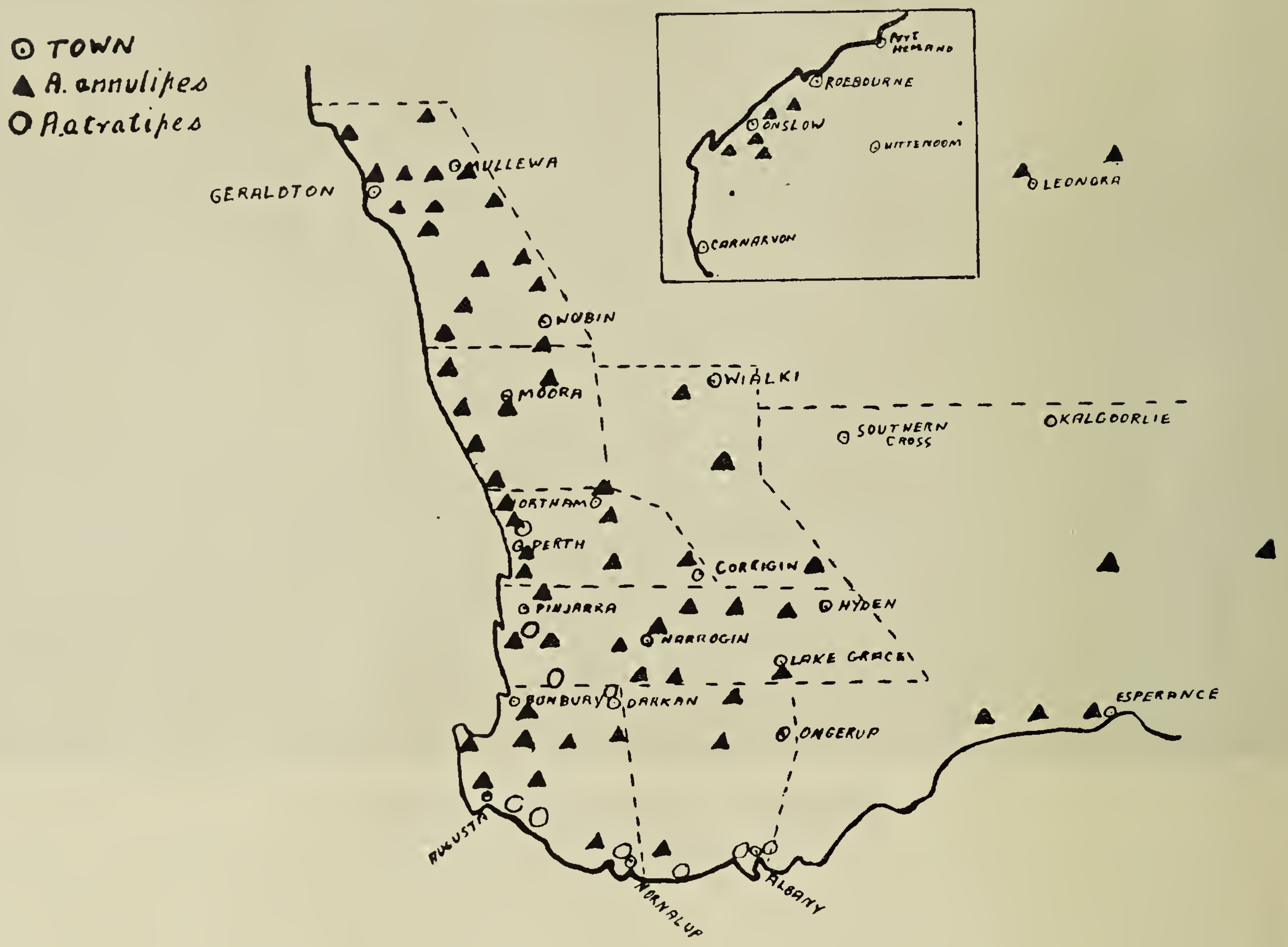


MERREDIN – Freshwater culvert pool
Aedes alboannulatus

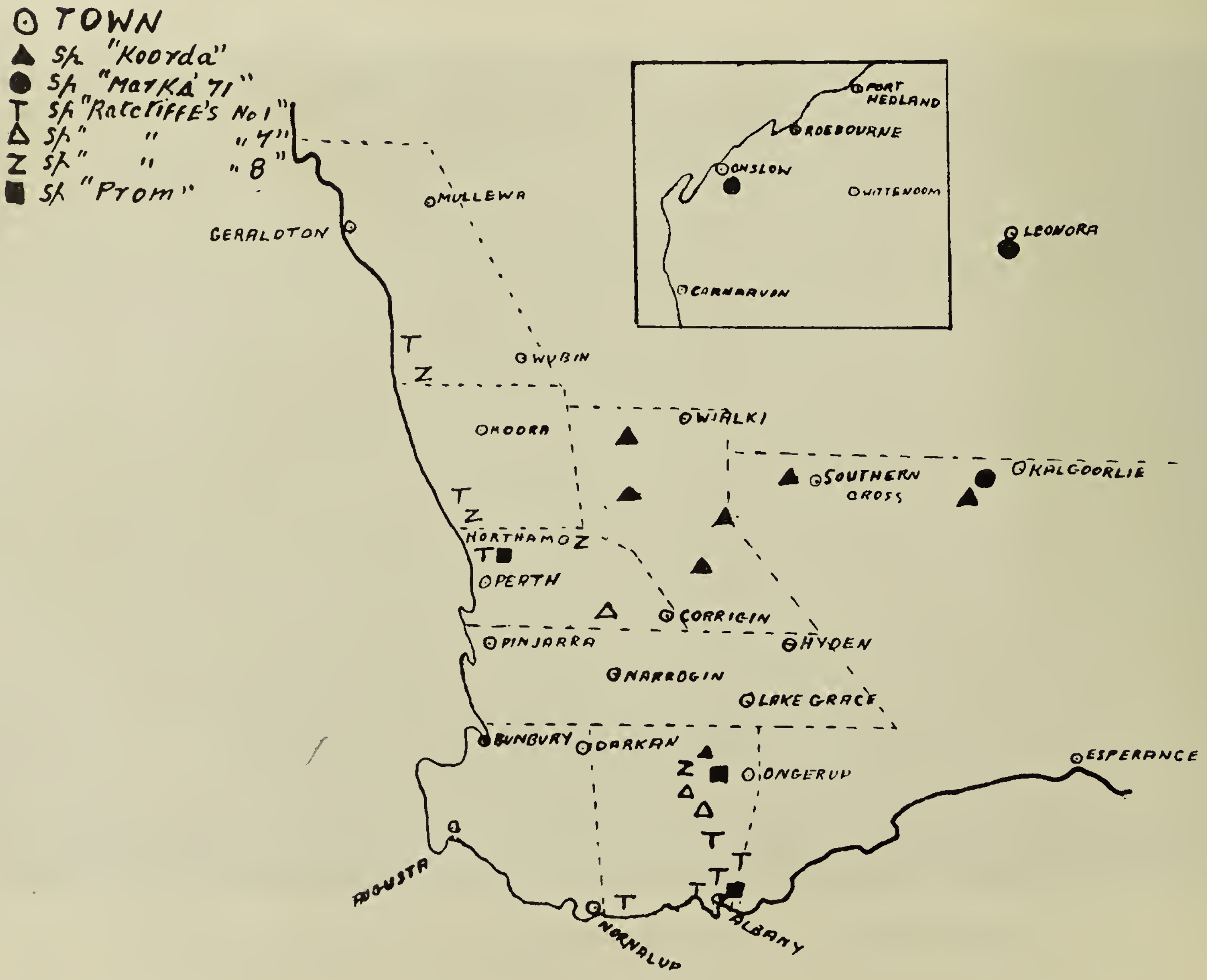


BRUCE ROCK – Fresh pool on Kulbullikin Rock, typical habitat of
Aedes occidentalis

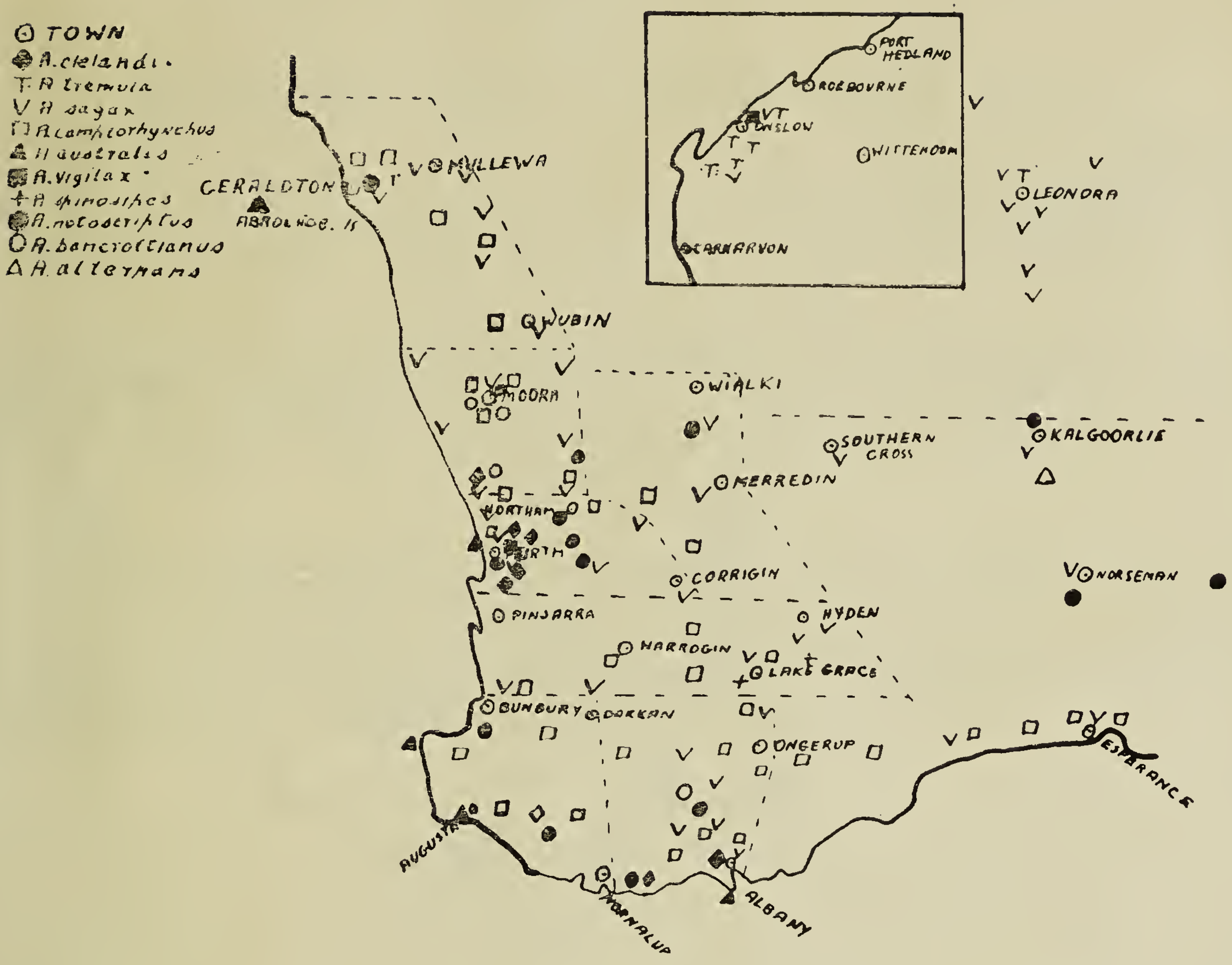
DISTRIBUTION OF ANOPHELES SPECIES IN THE SOUTH-WEST OF WESTERN AUSTRALIA



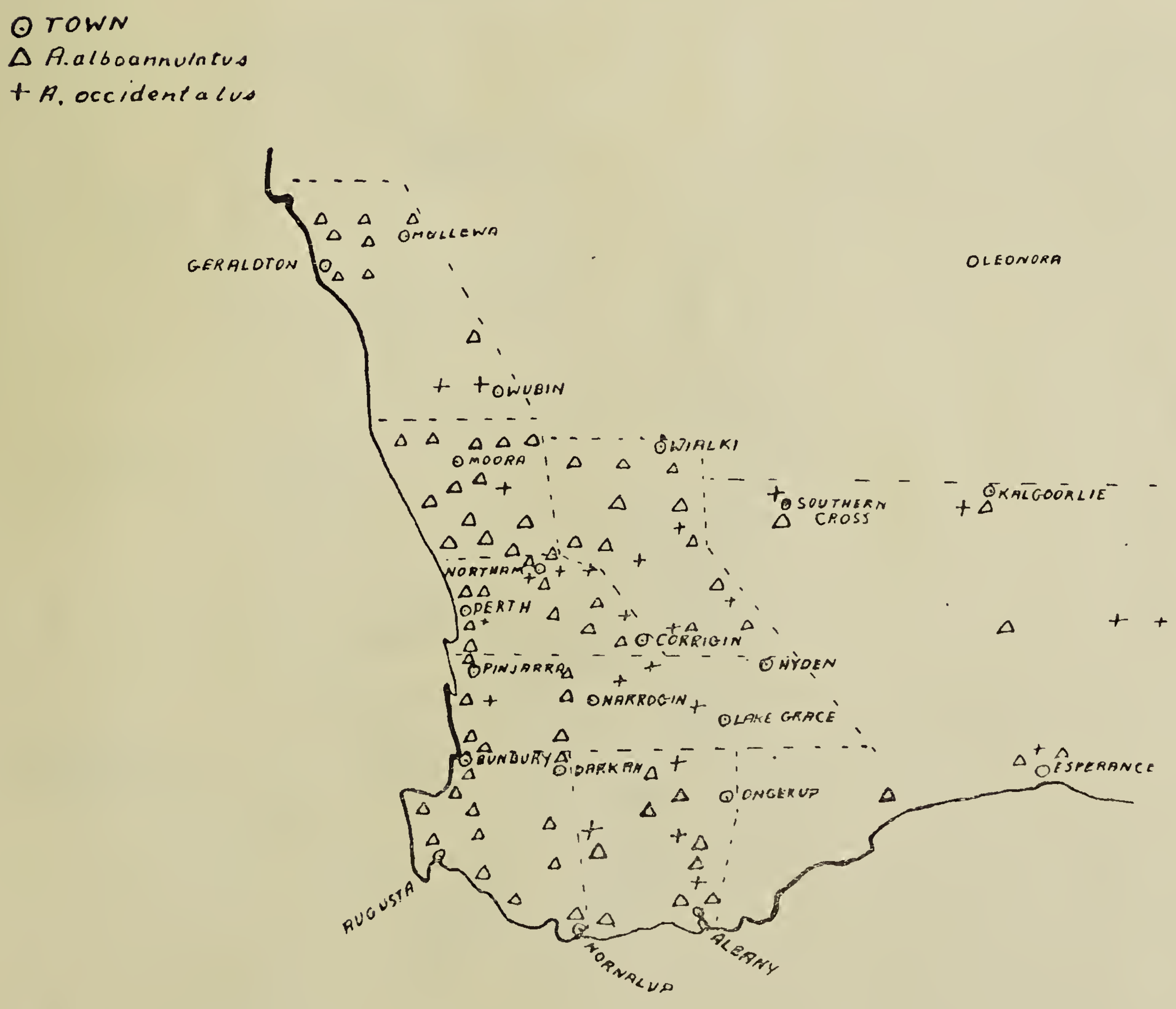
DISTRIBUTION OF NEW AND UNDESCRIBED AEDES SPECIES IN THE SOUTH-WEST OF WESTERN AUSTRALIA



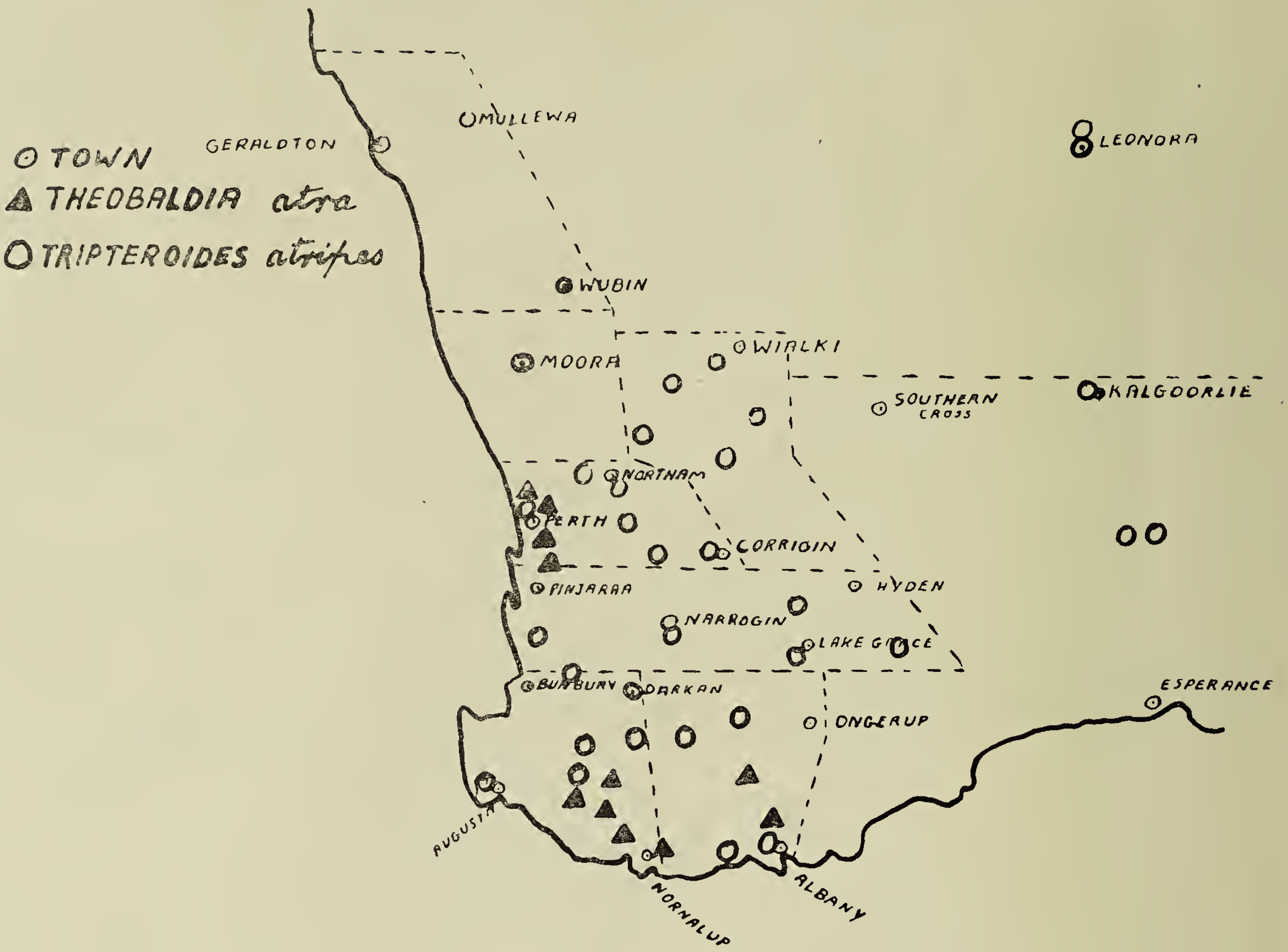
DISTRIBUTION OF SOME AEDES SPECIES IN THE SOUTH-WEST OF WESTERN AUSTRALIA



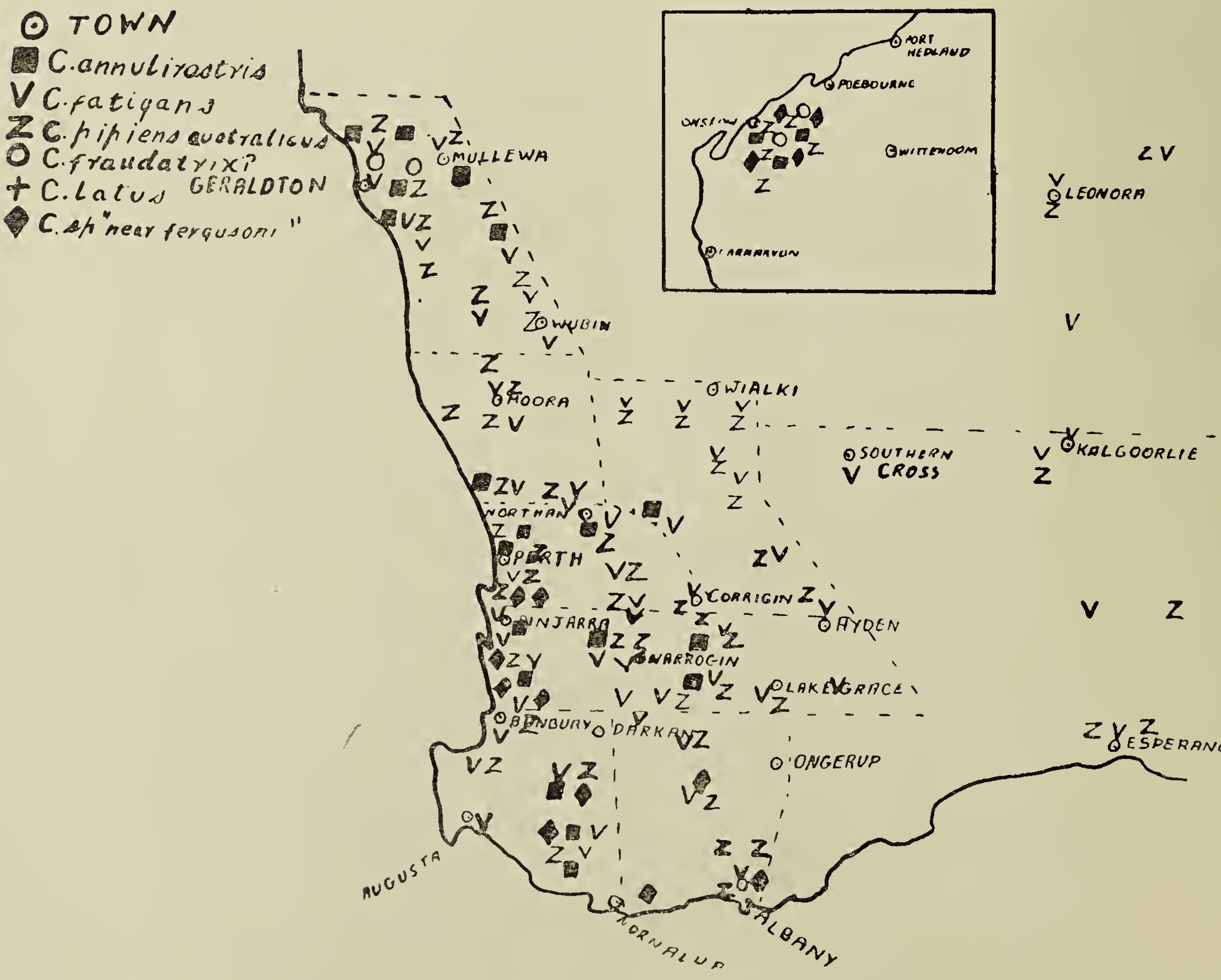
AEDES ALBOANNULATUS GROUP



DISTRIBUTION OF THEOBALDIA AND TRIPTEROIDES SPECIES IN THE SOUTH-WEST OF WESTERN AUSTRALIA



DISTRIBUTION OF SOME CULEX SPECIES IN THE SOUTH-WEST OF WESTERN AUSTRALIA



Appendix VIII.

REPORT BY DR. DEBNEY – VENEREAL DISEASES SECTION.

In 1956 there was a slight increase in notifications compared with the previous few years. From attendance figures, this increase was due to a greater number of male attenders suffering from gonorrhoea. As in previous years, females constituted less than 4 per cent. of notifications of this disease.

Non-gonococcal urethritis accounts for approximately half of all cases seen and, though it presents diagnostic and therapeutic difficulties, it causes the individual generally little physical disability. It appears to be due to a variety of causes and research has given us very little new knowledge over the past 15–20 years. Its incidence is likely to parallel the number of contraceptive measures and new antibiotics introduced.

In contrast to gonorrhoea and non-gonococcal urethritis, the spread of syphilis appears to be under control. Constant vigilance, however, is of prime importance if this state of affairs is to be maintained, and only routine blood testing will bring to light cases of latent syphilis as well as assisting in the diagnosis of the late manifestations. As syphilitic heart disease is usually not evident less than 15 years after infection, there must still be many cases yet to be discovered from the 1939–1946 period.

Appendix IX.

VENEREAL DISEASE IN WESTERN AUSTRALIA.

1955 – 1956

	Male.		Female.		Total.	
	1955.	1956.	1955.	1956.	1955.	1956.
Syphilis—						
Primary	3	2	2	2	5	4
Secondary	....	2	1	3	1	5
Tertiary	5	1	3	2	8	3
Congenital	....	....	....	....	....	....
Total, Syphilis	8	5	6	7	14	12
Gonorrhoea	159	170	29	18	188	188
Chancroid	....	....	....	....	....	....
Granuloma*	....	....	1	....	1	....
Total, All Venereal Diseases	167	175	36	25	203	200

* Native.

Appendix X.

WESTERN AUSTRALIA

DERBY LEPROSARIUM

Admissions and Discharges for the Year 1956, compiled from Monthly Returns of the Superintendent.

Month of Year 1956.	Admissions.							Discharges.											Inmates Remaining in Leprosarium.		
	Male.			Female.			Total Ad-mitted.	Male.					Female.					Total Dis-charged.	Males.	Females.	Total Remain-ing.
	Ad-mitted.	Re-Ad-mitted.	Total Males.	Ad-mitted.	Re-Ad-mitted.	Total Females.		Dis-charged Cured.	De-ceased.	Ab-sconded.	Dis-charged Non-In-fectious.	Total Males Dis-charged.	Dis-charged Cured.	De-ceased.	Ab-sconded.	Dis-charged Non-In-fectious.	Total Females Dis-charged.				
January	....	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....	....	1	132	78	210
February	1	1	2	1	....	1	3	....	2	....	....	2	....	....	....	....	....	2	132	79	211
March	1	2	3	3	2	5	8	6	....	....	....	6	8	....	....	....	8	14	129	76	205
April	....	....	....	....	....	....	....	3	....	....	....	3	3	....	....	....	3	6	126	73	199
May	....	....	....	1	....	1	1	....	1	1	....	2	....	....	1	....	1	3	124	73	197
June	2	....	2	....	....	....	2	1	....	....	....	1	1	....	....	....	1	2	125	72	197
July	4	....	4	....	....	....	4	4	....	....	....	4	1	....	....	....	1	5	125	71	196
August	1	2	3	1	1	2	5	2	2	....	....	4	2	....	....	....	2	6	124	71	195
September	....	2	2	....	1	1	3	2	....	....	....	2	2	....	....	....	2	4	124	70	194
October	....	2	2	2	....	2	4	....	....	1	....	1	1	....	....	....	1	2	125	71	196
November	....	....	....	....	1	1	1	....	....	....	....	....	....	....	....	....	....	....	125	72	197
December	1	....	1	2	....	2	3	....	1	....	....	1	1	....	....	....	1	2	125	73	198
Total	10	9	19	10	5	15	34	18	6	3	....	27	19	....	1	....	20	47	....	....	....

Analysis of Admissions and Discharges during Year 1956.

Inmates as at 31st December, 1955	211
Admissions for period ended 31st December, 1956	34
Discharges for period ended 31st December, 1956	37
Deaths for period ended 31st December, 1956	6
Absconded for period ended 31st December, 1956	4
Total Remaining at Leprosarium, 31st December, 1956	198

Appendix XI.

ABSTRACT OF CONTRIBUTIONS TO THE LITERATURE BY AUTHORS ASSOCIATED WITH THE DEPARTMENT, 1956.

(From the Library)

Norgard, W. G.

" *Electrophotography in Medicine,*" Journal of the Oil and Colour Chemists' Association, Vol. 39, 857–862.

" Radiography has been described as the most powerful single diagnostic device in medicine. It is certainly the most expensive to provide and is a formidable consumer of materials. This paper covers the applications of xerography in medical radiology. The special properties of electrophotography comprise : no dependence upon water supply, ambient temperature or darkroom ; very short interval between exposure and finished result ; immunity to accidental fogging ; inexpensive materials used ; one type of recording medium, in particular re-usable ; processing apparatus simple, portable and independent of electric and water mains ; very pronounced ability to display both soft tissue and bone at once ; colour contrast quickly and inexpensively available ; resolving power almost unlimited."

Snow, D. J. R.

" *The Spot Map in Epidemiology : A Note on the Use of Spot Maps During Two Epidemics of Poliomyelitis in Western Australia.*" Medical Journal of Australia, Vol. i, 702–704.

" A new technique of serial spot maps devised during the study of epidemic poliomyelitis is described. It is suggested that this technique can be applied to epidemics of other diseases and may furnish information not readily available by other means."

Vos, G. H. and Kelsall, G. A.

" *A New Elution Technique for the Preparation of Specific Immune Anti-Rh Serum.*" British Journal of Haematology, Vol. 2, 342–344.

" A method for the differential separation of mixed Rh antibodies into their separate specific entities by an elution technique is described. The wanted antibody is removed from the mixture by absorption upon specifically reactive red cells which are then separated, washed and haemolysed in distilled water. The cell stromata with attached antibody are precipitated by the addition of hydrochloric acid and then washed, after which they are placed in A1B serum. The addition of ether releases the antibody into the serum ; the inert stromata are then removed by centrifugation and the ether by aeration.

The technique allows the complete recovery of individual Rh antibodies from the sensitised red cells."

Appendix XII.

The Commissioner of Public Health

Sir,

I have the honour to submit to you a report on the work done by the Infant Health Service (including Pre-School Health) for the year 1956.

During 1956, a total of 24,835 individual babies attended Infant Health Centres throughout the State. Gross attendances at Clinics were 214,588 babies.

The Infant Mortality was 20·47 per thousand, a slight improvement on the figures for 1955, which were 22·44. The 1956 figure is the lowest recorded so far in Western Australia.

CENTRES

The number of Centres in use increased and the position is now as follows :—

	Main Centres	Sub-Centres
Metropolitan	28	83
Country	23	168

New buildings were opened at :—

Dalkeith
Doubleview
Hackett Estate
Hilton Park
Kenwick
Maylands
Medina
Northam (with quarters)
North Fremantle
Scarborough
Tambellup
Three Springs

All these Centres were built with Government assistance except Dalkeith, which was built by Nedlands Road Board.

There were a number of buildings under construction at the end of 1956 :—

Denmark
Manning Park
Morawa
Rockingham (with Quarters)
Mt. Barker (with Quarters)
Mundaring (with Quarters)

There are prospects that some of the local authorities will be building Centres in their areas in the near future.

There are 88 proper clinic buildings in the State and most of them are well planned and equipped. Renovations are necessary in the near future to two of these Centres, both of which were originally cottages.

The future aim is to build smaller Centres in an effort to replace some of the very sub-standard premises being used at present for want of better accommodation. Smaller centres and more of them mean that mothers will have shorter distances to walk to centres and there should be better attendances. Although we are grateful to carry on our work, it is always found that the opening of a new Centre in any district immediately increases the numbers of mothers who come to seek advice.

CARAVANS

Three new caravans were added to the one already in service. They have bases at Midland Junction, Armadale and Mundaring and are used to contact Mothers in the districts surrounding these bases. The response by the public to this service has been very good.

The caravans are heavy for the Sisters to drive and not every Sister is willing to undertake this arduous task. The caravans stop at certain pre-arranged places or may even be driven up to houses, where the nearby mothers gather to see Sister. The four caravans have 111 stopping places.

HOME VISITS

A total of 21,418 visits were paid by the Sisters ; 222 letters of advice were written. Advice by telephone was given to 4,173 enquirers.

STAFF

There are 61 full-time Infant Health Sisters in the State and we employed three part-time Relieving Sisters. Triple Certificated Sisters are in very short supply here because of the fact that there is no Training School in this State. We are often quite desperate for staff, especially in case of sickness, and we are grateful to several retired Sisters who come to our aid in emergencies so that this year no Centre has had to close down.

Sister Jones, who devoted a long period of her life to Infant Health in this State, retired from Nedlands Centre in January.

LONG SERVICE LEAVE

This year for the first time, long service leave was granted to Infant Health Sisters and the following Sisters took advantage of this :—

Sister Twine, Sister Hall, Sister Carroll, Sister Boylson, Sister Broadley.

CORRESPONDENCE SECTION

Sister Philbin and Sister McGaffin undertake this part of the Service. This year Sister Philbin began to teach Mothercraft by correspondence to schoolgirls in the North-West and Murchison and is having a very good response to this new venture. Sister has prepared a whole series of teaching letter-questionnaires, suitably illustrated by herself and from the results which she has achieved by this method it seems that she is really getting to her pupils the lesson in Mothercraft which she wishes them to learn.

There are a great many native and half-caste girls learning Mothercraft by correspondence and it is hoped to expand this service in the future. Sister keeps in personal touch with these girls, too, by visiting them when she makes her regular visits to the North-West and the Murchison.

Correspondence Infant Health and Correspondence Mothercraft are expanding so much that it may be found necessary to add to the staff next year.

The following is a summary of the activities of this branch of Infant Health :—

Births reported	497
New Babies (referred from other areas)	194
Individual Babies	356
Pre-School Consultations	98
Letters Received—	
Mothers	795
Others	216
Mothercraft Children's Completed Lessons	939
Letters Sent—	1,830
Mothers	435
Others	519
Mothercraft Lessons Sent	1,420
Expectant Mothers (advice given)	33
Visits to Centre—	
Country Babies	98
Country Pre-School	12
Expectant Mothers	10
Telephone Calls	131

During 1956 Sister Philbin made journeys throughout the Murchison, Kimberleys and North-West by plane, train, car and lugger in order to carry out her duties. She visited :—

Mt. Magnet
Cue
Meekatharra
Yalgoo
Wiluna
Onslow
Roebourne
Pt. Hedland
Derby
Broome
Wyndham
Fitzroy Crossing
Cockatoo Island
Sunday Island
Wittenoom
Wodjolum
Karalundi
Shark Bay

Sister Philbin also did the Station Run by the Flying Doctor plane. During these trips she saw 132 babies and 196 pre-school children.

TRANS-TRAIN SERVICE

This service was run five times in 1956. The work is increasing so much that two nurses now go on each trip. In July a School Sister was one of the team. In September and December I accompanied the Sisters on the trip and gave the first and second injections of the Salk Vaccine on each trip. The response was excellent and about 500 injections were given to children and expectant mothers on each trip. Some children were brought 100 miles to get their Salk Vaccine.

The numbers seen during 1956 were :—

	Western Australia	South Australia	Total
Babies	64	48	112
Toddlers	54	47	101
Pre-School	145	113	258
School Children	152	81	233
Expectant Mothers	7	14	21
Adults	32	52	84
Grand Total			809

Total numbers of Salk Vaccine given were :—

	Western Australia	South Australia	Total
September	197	320	517
December	172	301	473
Grand Total			990

PRE-SCHOOL HEALTH

Sister Ashton continued as Pre-School Sister and had a successful year. Pre-School work requires more time and patience than Infant Health but the numbers of Mothers seeking advice are increasing steadily.

PRE-SCHOOL HEALTH COURSE

This in-service course for Sisters on the staff was completed in 1956. Seven Sisters sat for the examination and passed very creditably. One Sister had to give up the course due to ill-health.

The Sisters qualified to do Pre-School Clinics hold them at their own Centres, setting aside certain days during the month for this work.

Sister Ashton continued to visit metropolitan Centres where the Sisters are not qualified to do this special work.

Pre-School Attendances :—

Clinics Held	194
Attendances	1,090
Broadcasts	16

These broadcasts were written and recorded and later broadcast from radio stations in Perth, Kalgoorlie and Geraldton.

Pre-School Health has got off to a good start and when more Sisters are trained the number of attendances will be greatly increased.

MOTHERCRAFT LECTURES

Two Sisters lectured throughout the year. This part of the work increased during 1956. Sister Craig combined her lecturing duties with her work on the Trans Train and Sister Kerr with a monthly visit to Carnarvon and with Parentcraft Lectures and Mothercraft Lessons to Expectant Mothers. The Parentcraft Lectures are for both parents and are held at night. Three Courses were held during the year, each Course consisting of six night lectures. We are very much indebted to Miss Malden of the Kindergarten Training College who gave one lecture in each of this series.

During 1956 senior girls in many State and Private Schools were given Mothercraft Lectures. Lectures were also given at the Government Central Training School for Nurses, Technical College, Kindergarten Training College and Teachers' Training College. St. John's Nursing and First Aid was also taught in some schools. In many country High Schools and private schools the local Infant Health Sister gives the Mothercraft Lectures.

Lectures given during 1956 as follows :—

Country Schools	247 lectures
Metropolitan	367 lectures
Supervised Examinations in Metropolitan Schools	25
Lectures to organisations (Red Cross, St. John's Ambulance, etc.)	23 lectures
Expectant Mother Groups	13 lectures
Parentcraft Lectures	18 lectures

Thirty-six Radio Talks were written by Sister Kerr and recorded ; later being relayed from Stations in Perth, Kalgoorlie and Geraldton.

An innovation this year has been the " Clinic of the Air " from Carnarvon. During her monthly visit Sister Kerr conducts a question and answer session on the pedal wireless, with excellent results. If time permits, Sister gives a short talk on some subject of interest to Mothers, such as Teeth, Shoes, Clothing, etc. In this way, mothers in the outback are being kept in touch with modern trends in the rearing of children.

ELIZABETH M. GIBSON,
Medical Supervisor of Infant Health.

ANNUAL SUMMARY, JANUARY – DECEMBER, 1956.

Centres.	Gross Number of Attendances.					Individual Babies Attended.					Birth Notifications Received.	New Babies.	Transfers from other Centres.	Visiting Babies.	Individual Expectant Mothers.
	Under 12 months. (1)	1–2 years. (2)	Total 1 + 2. (3)	Over 2 years. (4)	Grand Total 3 + 4. (5)	Under 12 months. (6)	1–2 years. (7)	Total 6 + 7. (8)	Over 2 years. (9)	Grand Total 8 + 9. (10)	(11)	(12)	(13)	(14)	(15)
Country—															
Albany	3,957	278	4,235	131	4,366	454	85	539	77	616	431	293	14	85	3
Beverley	2,145	296	2,441	166	2,607	274	72	346	61	407	216	186	12	17	30
Boulder	2,538	169	2,707	80	2,787	211	71	282	35	317	235	157	16	36	9
Bridgetown	2,909	288	3,197	67	3,264	266	112	378	32	410	257	211	20	13	1
Bruce Rock	2,338	90	2,428	21	2,449	261	41	302	17	319	208	180	11	15	8
Bunbury	4,417	172	4,589	41	4,630	427	74	501	25	526	313	271	19	40	1
Busselton	4,246	392	4,638	128	4,766	346	46	392	30	422	267	250	12	42	4
Caravan No. 3 (Mundaring)	3,879	197	4,076	100	4,176	243	71	314	44	358	168	170	8	23	51
Carnarvon	272	91	363	57	420	63	7	70	26	96	63	49	6	1	2
Collie	2,364	177	2,541	201	2,742	270	20	290	7	297	209	192	....	18	13
Corrigin	1,966	379	2,345	374	2,719	223	122	345	139	484	200	175	16	105	24
Geraldton	3,847	119	3,966	....	3,966	428	40	468	....	468	369	285	13	67	3
Harvey	2,732	150	2,882	77	2,959	301	54	355	27	382	221	199	11	21	2
Kalgoorlie	4,983	378	5,361	261	5,622	348	183	531	134	665	341	342	12	109	2
Katanning	3,315	312	3,627	176	3,803	238	138	376	52	428	314	237	10	32	25
Kellerberrin	2,765	280	3,045	97	3,142	309	83	392	42	434	186	161	28	63	6
Manjimup	3,451	341	3,792	194	3,986	292	50	342	75	417	263	238	....	24	22
Moora	3,311	576	3,887	332	4,219	440	97	537	81	618	260	240	21	136	46
Narrogin	2,090	226	2,316	143	2,459	269	104	373	88	461	293	188	26	22	1
Northam	2,066	109	2,175	62	2,237	314	43	357	23	380	237	211	21	24	8
Pinjarra	1,894	98	1,992	2	1,994	157	40	197	1	198	202	116	10	90	....
Three Springs	3,730	539	4,269	301	4,570	236	172	408	130	538	216	220	22	16	25
Wagin	2,508	280	2,788	74	2,862	310	94	404	37	441	247	180	10	35	3
Wyalkatchem	2,676	154	2,830	45	2,875	353	66	419	42	461	217	218	15	14	78
Metropolitan—															
Applecross	4,806	358	5,164	261	5,425	498	101	599	132	731	249	255	33	139	13
Bayswater	5,281	271	5,552	72	5,624	351	183	534	14	548	434	369	38	34	16
Belmont	3,739	83	3,822	3	3,825	412	64	476	2	478	443	258	20	16	9
Bicton	4,829	375	5,204	....	5,204	280	213	493	....	493	352	286	39	20	....
Caravan No. 1 (Fremantle)	3,788	622	4,410	658	5,068	240	109	349	70	419	280	260	33	56	13
Caravan No. 2 (Midland Junction)	1,878	188	2,066	36	2,102	165	50	215	14	229	125	121	....	1	....
Caravan No. 4 (Armadale)	3,074	260	3,334	131	3,465	247	62	309	11	320	158	144	16	42	17
Claremont	2,632	91	2,723	213	2,936	248	52	300	10	310	227	181	....	....	....
Cottesloe	4,529	431	4,960	27	4,987	411	128	539	56	595	256	246	10	82	4
Doubleview	3,930	132	4,062	....	4,062	456	100	556	....	556	257	225	31	27	....
East Fremantle	3,832	313	4,145	236	4,381	267	35	302	47	349	255	217	30	34	7
Fremantle	4,159	269	4,428	154	4,582	433	101	534	59	593	327	202	43	89	....
Gosnells	4,607	301	4,908	95	5,003	420	70	490	20	510	344	216	20	56	15
Hilton Park	2,589	155	2,744	35	2,779	366	32	398	8	406	231	167	47	6	....
Inglewood	4,770	299	5,069	54	5,123	471	124	595	29	624	343	296	38	66	47
Kalamunda	3,548	106	3,654	7	3,661	347	56	403	11	414	189	165	19	11	....
Kensington	4,929	149	5,078	139	5,217	495	117	612	35	647	386	341	12	73	....
Leederville	4,712	210	4,922	159	5,081	182	46	228	74	302	302	298	60	65	29
Maylands	4,948	200	5,148	13	5,161	322	188	510	13	523	287	303	41	86	5
Midland Junction	4,871	308	5,179	19	5,198	442	101	543	9	552	386	246	34	66	1
Nedlands	2,595	172	2,767	53	2,820	192	71	263	1	264	170	168	25	73	11
North Perth	5,355	252	5,607	46	5,653	549	90	639	29	668	304	313	43	43	25
Osborne Park	4,154	160	4,314	9	4,323	455	90	545	6	551	535	302	57	83	....
Perth	4,422	236	4,658	103	4,761	422	116	538	44	582	369	369	67	214	73
Rockingham	3,006	171	3,177	15	3,192	208	68	276	10	286	158	166	10	56	28
Scarborough	3,667	293	3,960	113	4,073	223	78	301	46	347	208	182	31	3	7
South Perth	4,445	176	4,621	70	4,691	270	157	427	48	475	316	260	43	78	....
Subiaco	3,930	308	4,238	268	4,506	331	186	517	163	680	208	299	38	69	17
Victoria Park	5,208	112	5,320	1	5,321	547	64	611	1	612	357	461	72	229	6
Wembley	5,280	272	5,552	97	5,649	386	114	500	26	526	319	327	47	72	22
West Perth	1,061	29	1,090	5	1,095	68	29	97	5	102	56	75	5	29	3
Total	194,973	13,393	208,366	6,222	214,588	17,737	4,880	22,617	2,218	24,835	14,764	12,767	1,335	2,966	735

ANNUAL SUMMARY, JANUARY – DECEMBER, 1956—continued.

Centres.	Medical Visits.												Advice by Letter. (28)	Advice by Telephone. (29)	Mothers Referred Correspondence Sister. (30)	Lectures given. (31)	Group Demonstrations. (32)	Deaths. (33)
	Doctor.		Hospital.		Total.		Hospital (Number of Babies). (22)	Home.										
	Baby Referred. (16)	Mother Referred. (17)	Baby Referred. (18)	Mother Referred. (19)	Babies Referred 16 + 18. (20)	Mothers Referred 17 + 19. (21)		To Babies, First. (23)	To Babies, Subsequent. (24)	Expectant Mothers. (25)	Ineffective. (26)	Total 25 — 26. (27)						
Country—																		
Albany	93	21	....	....	93	21	381	45	150	1	5	201	33	165	1	12	6	....
Beverley	16	7	....	....	16	7	229	58	43	6	11	118	6	109	7	33	12	1
Boulder	48	6	....	....	48	6	173	159	40	1	41	241	2	41	8	5	....	2
Bridgetown	29	4	....	....	29	4	225	39	308	5	5	357	....	91	....	....	....	....
Bruce Rock	43	8	....	....	43	8	326	74	67	3	3	147	1	14	4	7	3	....
Bunbury	44	4	....	....	44	4	419	222	39	....	36	297	....	79	24	....	....	....
Busselton	52	7	....	....	52	7	173	60	258	....	64	382	29	35	13	....	....	4
Caravan No. 3 (Mundaring)....	50	14	....	....	50	14	....	149	1,320	....	13	1,482	....	26	....	....	....	....
Carnarvon	10	2	....	....	10	2	27	18	23	....	5	46	7	13	7	8	8	....
Collie	38	26	6	....	44	26	129	292	387	17	....	696	10	3	2	....	....	....
Corrigin	49	1	1	....	50	1	175	14	301	....	10	325	2	72	....	....	....	....
Geraldton	32	2	1	1	33	3	310	28	42	....	....	70	....	110	2	27	....	4
Harvey	13	5	....	....	13	5	158	4	51	1	....	56	....	1	....	2	....	....
Kalgoorlie	95	46	....	....	95	46	514	216	2	....	5	223	4	381	....	40	20	2
Katanning	18	4	....	....	18	4	342	13	83	....	7	103	5	56	2	9	1	1
Kellerberrin	26	6	....	....	26	6	231	32	289	....	6	327	1	52	....	20	....	1
Manjimup	90	4	....	....	90	4	267	29	....	....	....	29	....	124	....	15	4	3
Moora	11	1	....	....	11	1	175	....	8	....	....	8	....	4	4	....	....	3
Narrogin	33	6	....	....	33	6	211	59	27	1	8	95	6	54	2	10	1	2
Northam	39	11	....	....	39	11	364	131	65	....	51	247	....	43	....	15	1	....
Pinjarra	11	....	....	....	11	....	108	108	7	....	....	115	1	....	....	5	....	....
Three Springs	73	27	3	2	76	29	197	23	51	2	....	76	11	172	....	3	....	3
Wagin	75	7	....	....	75	7	144	25	158	3	9	195	3	39	3	24	....	....
Wyalkatchem	11	2	1	....	12	2	120	146	92	....	16	254	1	18	....	....	....	2
Metropolitan—																		
Applecross	20	2	....	....	20	2	....	264	242	....	....	506	....	376	....	....	....	....
Bayswater	71	14	3	....	74	14	....	363	439	1	59	862	....	5	....	....	....	....
Belmont	23	....	....	....	23	....	....	378	8	....	....	386	....	....	....	....	....	1
Bicton	45	17	....	....	45	17	....	234	85	....	....	319	....	107	....	....	....	....
Caravan No. 1 (Fremantle)....	148	9	....	....	148	9	....	232	110	7	120	469	25	....	....	....	....	....
Caravan No. 2 (Midland Jct.)	42	8	1	....	43	8	....	37	29	1	13	80	....	....	....	....	....	....
Caravan No. 4 (Armadale)	37	8	2	....	39	8	171	....	....	....	....	....	....	....	1	....	....	....
Claremont	29	3	3	....	32	3	....	225	897	....	....	1,122	....	....	....	....	....	....
Cottesloe	36	3	....	....	36	3	59	268	162	....	....	430	....	....	....	....	....	....
Doubleview	22	3	....	....	22	3	....	210	45	....	93	348	....	....	....	....	....	....
East Fremantle	109	11	....	....	109	11	273	176	148	....	....	324	....	....	....	....	....	....
Fremantle	66	5	....	....	66	5	717	281	546	....	31	858	....	250	2	....	173	....
Gosnells	45	4	....	....	45	4	....	141	310	5	45	502	....	....	....	....	....	....
Hilton Park	19	1	....	1	19	2	....	192	132	....	50	374	....	....	....	....	....	....
Inglewood	75	13	....	....	75	13	....	237	29	....	29	295	5	70	1	....	....	....
Kalamunda	36	20	....	1	36	21	....	125	1,075	....	49	1,249	....	84	....	....	....	1
Kensington	39	3	....	....	39	3	....	292	53	....	79	424	65	....	....	....	....	2
Leederville	47	10	1	....	48	10	....	309	212	5	42	568	....	....	....	....	....	....
Maylands	91	2	....	....	91	2	1,372	266	177	1	96	540	....	177	....	....	....	....
Midland Junction	37	....	....	....	37	....	540	164	35	....	42	24	....	71	....	....	....	2
Nedlands	7	1	1	....	8	1	43	101	181	....	25	307	....	75	....	....	....	....
North Perth	64	17	....	....	64	17	384	271	140	1	66	478	2	65	....	....	....	....
Osborne Park	7	3	1	....	8	3	....	321	412	....	79	812	....	1	....	....	....	....
Perth	106	27	2	....	108	27	....	378	237	4	87	706	....	401	....	....	....	1
Rockingham	25	....	....	....	25	....	174	154	250	....	8	412	1	42	....	12	12	1
Scarborough	42	2	....	....	42	2	....	242	398	12	41	693	....	....	....	....	....	....
South Perth	54	7	....	....	54	7	....	281	191	....	14	486	1	178	....	....	....	....
Subiaco	111	3	19	....	130	3	13	257	203	2	6	468	1	204	....	....	....	....
Victoria Park	46	3	....	....	46	3	....	558	26	....	15	599	....	220	....	....	....	....
Wembley	18	....	....	....	18	....	....	301	101	....	8	410	....	95	....	....	....	....
West Perth	9	3	2	1	11	4	....	31	14	....	15	60	....	50	....	....	....	....
Total	2,525	420	47	6	2,572	426	9,144	9,233	10,698	79	1,408	21,418	222	4,173	83	247	241	36

Appendix XIII.

SCHOOL MEDICAL SERVICE

The School Medical Service was reorganised in May 1956. In place of a Senior School Medical Officer controlling the whole State and distributing the work among a number of School Medical Officers the State was divided into three Regions and a Regional School Medical Officer was placed in charge of each. The intention was to place in each Region a Regional School Medical Officer and a School Medical Officer as his assistant. So far only in Region 3 has this establishment been obtained. Regions 1 and 2 still await the appointment of the assisting School Medical Officer. Each regional School Medical Officer and School Medical Officer requires the assistance of two school nurses, one to assist him in his medical inspections and the other to maintain a system of hygiene inspections and home visits for follow-up of cases notified as suffering from some defect.

The establishment therefore is three Regional School Medical Officers, three School Medical Officers and thirteen School Nurses including a school nurse required as headquarters staff.

Each Regional School Medical Officer is responsible for planning the itinerary of schools to be examined and the work to be carried out in his Region. The objective is to examine the child three times in its school career with one further examination if he proceeds to High School. Examinations will be on new entrants, at the age of nine and again between the age of twelve and fourteen. This applies to the Metropolitan area only as it involved a visit to each school every year. Because of travelling times and distances the programme for the country must remain at a complete examination of all pupils in a school every two to three years.

During 1956 the work was carried out by three Regional School Medical Officers, one School Medical Officer and nine nurses. Because of this shortage of staff it was impossible to begin the programme intended for the proper establishment. All three Regions have concentrated on trying to make up on a considerable accumulation of work that has arisen from this shortage of staff. A number of schools in each Region had not been visited for three years and most of the work in 1956 was directed towards bringing these schools up to date. The new programme of inspections was not therefore developed in 1956.

Recently the situation as regards applicants for the School Medical Service has improved and it is hoped soon to obtain the proper establishment.

The new system has, however, already shown considerable advantages over the old in that the Medical Officers, being placed in charge of definite areas and schools, feel a greater sense of responsibility to the children in these schools and are able to follow them through their school life and thereby maintain that interest. It also improves the relationship between the school doctor and the specialist or family doctor to whom a child is referred because both the specialist and the family doctor now feel that the School Medical Officer has a permanent responsibility towards the child he refers.

This permanent responsibility towards the child also has had a bearing on the school doctor's relationship with the parent. More encouragement is being given to the parents to meet and discuss problems with the school doctor who with his nurses is now becoming better known to the parents. School doctors interviewed 631 parents in 1956.

From Table I it can be seen that 37,773 children were medically examined and of these 14,969 were notified as having some defect or other. The vast majority of defects, however, come within the category of being referred for attention by the parent or they were dental defects. Eight thousand two hundred and forty-one children required dental treatment. Four thousand four hundred and nineteen children were referred for further medical attention. Slightly more children were examined in 1956 than in 1955 and the proportion notified with most ailments is slightly less.

Table I

EXAMINATION OF METROPOLITAN AND COUNTRY SCHOOL CHILDREN, 1956

——	Number Examined	Number Notified	Number referred for Medical Attention	Number referred for Home Attention and Observation	Number requiring Dental Attention	Skin Complaints.		Nutrition.			Eyes Medical Attention	Tonsils Medical Attention
						Number	Per cent.	3	Under 3	Over 3		
Metropolitan Schools												
Boys	15,230	5,637	1,678	1,974	3,061	....	....	13,701	397	1,132	....	....
Girls	15,436	6,197	1,941	2,458	3,234	....	....	13,318	537	1,581	....	....
Total	30,666	11,834	3,619	4,432	6,295	2,281	7·44	27,019	934	2,713	1,506	342
Country Schools												
Boys	3,705	1,582	413	366	1,086	....	....	3,337	146	222	....	....
Girls	3,402	1,553	387	471	1,040	....	....	2,836	232	334	....	....
Total	7,107	3,135	800	837	2,126	217	3·05	6,173	378	556	392	63
State Total												
Boys	18,935	7,219	2,091	2,340	4,147	....	....	17,038	543	1,354	....	....
Girls	18,838	7,750	2,328	2,929	4,274	....	....	16,154	769	1,915	....	....
Total	37,773	14,969	4,419	5,269	8,421	2,496	6·61	33,192	1,312	3,269	1,892	405

Table II

HOME VISITING BY SCHOOL NURSES

Total Visits *re* Medical Attention	Received Attention	Promised Attention	Disinterested	Out or left District	Visits to Cases referred for Home Attention	Parents Phoned or called Office	Visited Commonwealth Acoustic Laboratory
2,853	1,403	858	28	744	227	171	506

HYGIENE INSPECTION BY NURSES FOR PEDICULOSIS

	No. of Children Examined	Number Notified	Percentage
Metropolitan	60,592	108	·18
Country	7,152	51	·71
Total	67,744	159	·23

Including revisits to above a total number of 146,661 heads were examined or re-examined.

The overall picture of nutrition appears good as 33,192 were of good normal nutritional standard, 3,269 were above this standard and 1,312 in various degrees below this standard.

Table II gives the result of the school nurses' work in follow-up home visiting and in hygiene inspections. The number of children that had received medical attention or were about to receive that attention following report by school Medical Officer shows excellent co-operation by the parent with the School Medical Officer.

Although the number of cases of pediculosis is small this matter causes considerable trouble in certain areas and is to a large extent associated with native and half-caste children. Where such a focus of infection is causing trouble in a school a special team which includes a school nurse is sent out from the Department to treat children, homes and families. This concentrated method of dealing with outbreaks has considerably reduced the recurrence rate.

This report is made from consolidating the reports of the Regional School Medical Officers. It does not include their references to inadequate facilities in schools for medical examinations. The need for medical examination rooms in all schools has already been stressed in previous Annual Reports.

Detailed reference to sanitary facilities and equipment in schools has also been omitted. When noted these are dealt with by direct reference to the Education Department. There has been a great over-all improvement in latter years but many old schools, particularly small country schools, are still in urgent need of improvement in this respect.

Region 1.—Regional School Medical Officer—A. R. Sadleir.
Nurses—M. Stent and P. Martin.
Number of Children 31,749.

Region 2. Regional School Medical Officer—M. J. Lyon.
Nurses—M. Sullivan and D. Gugeri.
Number of children 34,029.

Region 3. Regional School Medical Officer—G. H. Lowe.
School Medical Officer—K. J. Bily.
Nurses—D. Rogers, V. M. Anderson, K. Tupper and M. J. White.
Number of children 58,638.

W. S. DAVIDSON,
Deputy Commissioner of Public Health.

Appendix XIV.

REPORT OF CONSULTANT OPHTHALMOLOGIST

Professor Ida Mann

The work for the year falls under three main headings.

1. PARTIALLY SIGHTED AND BLIND CHILDREN

Through collaboration with the Department of Education, examination of educational assessment has continued. Fifteen new children were examined. Of these five were suitable for the Partially Sighted class, three were blind and seven were visually suitable for normal education.

The children already in the class were inspected. As was expected, the use of the eyes in these children has resulted in improvement of sight. Six are now well enough to go to a normal school and three more have improved. None have deteriorated. Only three totally blind children were found this year. The Headmaster of Thomas Street School tells me all the children in the Partially Sighted class are doing the work of normal children of the same age.

2. PURULENT OPHTHALMIA AND A.P.C. VIRUS DISEASE

An attempt was made to isolate the organism of epidemic mucopurulent conjunctivitis. It was found in most instances to be due to the Koch Weeks' bacillus. Five cases of a disease not so far previously diagnosed in this State (adeno-pharyngeal conjunctivitis) were also found but no further outbreaks have occurred to date.

3. TRACHOMA

Work on Trachoma has continued along three lines :—

(a) *Extension of surveys and amassing of further information.*

Through the good officers of the Queensland Native Affairs Department and the Commonwealth Health Department, I was able to visit the Queensland coast with its missions and native settlements and to carry out a survey of Groote Eyelandt, Daly River and Roper River. This showed that trachoma had been practically eliminated from Queensland owing largely to school campaigns but that it was widespread in its uncomplicated form in the Northern Territory.

(b) *Follow-up Surveys.*

A follow-up in the Kimberleys was also carried out and a marked diminution in the percentage of active cases of trachoma was noted. In 1953 88 per cent. of all cases of trachoma were in the active stage. In 1956 this had decreased to 48 per cent. The success of the treatment depends on the full co-operation of everyone and on the stringent supervision of every new entrant to school or mission. The results are satisfactory but the incidence is not yet down to 10 per cent. among natives.

(c) *Organisation of trachoma patrol routes.*

The whole State has been studied and divided into 46 patrol areas within which the trachoma officers and nurses function. It is planned to visit every place in the State once and then continue visits to all those showing more than 10 per cent. active trachoma. Three workers have been engaged on this travelling scheme, submitting reports of surveys and leaving treatment and instructions. They also carry a set of teaching slides and give talks on eye hygiene, treatment and prevention. This scheme is showing results, especially in schools.

IDA MANN,
Consultant Ophthalmologist.

Appendix XV.

The Commissioner of Public Health.

Following is my report for the year 1956.

STAFF

There were three resignations during the year and four appointments, the main feature of the latter being that two of them were to the permanent staff, so the proportion of the latter is slowly growing ; for most of the year the staff numbered thirteen which is the best we have attained since the establishment was increased to fourteen some years ago. The excellent staff position is of course reflected in the figures showing the amount of work which was done.

VEHICLES

Five condemned utilities and one mobile surgery were replaced by new vehicles.

HEALTH EXHIBITION AT GERALDTON

At the request of the Geraldton branch of the Dental Association I spent several days in that town helping with a dental health display at the local Industries Fair ; it created a fair amount of interest.

SUNSET

I visited this Institution on several occasions, at the request of the Matron, to do extractions for men who were confined to bed and so unable to be taken to the Dental Hospital.

SCHOOL DENTAL SERVICE

Following are figures concerning the School Dental Service for 1956 :—

Number of country schools visited	140
Number of metropolitan schools visited	16
Number of native missions visited*	14
Number of orphanages visited*	12

* Means both country and metropolitan.

Number of children examined	12,275
Number of children treated	7,468
Number of children needing no treatment	3,555
Number of children who were to receive treatment by private dentists	521
Number of children whose parents did not bother to reply to notices	731

Dental operations performed :

Silver Amalgam fillings	9,629
Copper Amalgam fillings	1,586
Cement fillings	763
Porcelain fillings	1,977
Silver Nitrate treatments	1,178
Other conservative treatments	6,440
Extractions	14,254
Prophylaxis	957
Talks, personal interviews, etc.	374
Gold inlays and crowns	5
Orthodontic treatment	4

A. G. McKENNA,
Senior Dental Officer.

Appendix XVI.

REPORT BY THE CHIEF INSPECTOR (General)

The Commissioner of Public Health.

Submitted herewith is a summary of the work of the Inspection Branch during 1956.

ENVIRONMENTAL SANITATION

Approval was given for the installation of 7,235 small domestic sewage treatment tanks. Most of these installations were for the treatment of sewage only, but the larger tank designed to treat both sewage and sullage was increasingly favoured by householders, plumbers and architects, and a much larger number of applications was received for this type than in the previous year.

It is interesting to note that the experimental tanks installed for the treatment of combined wastes five years ago are still functioning efficiently.

Officers of the branch have made inspections of all proposed new sub-divisions of land where the suitability of the area for housing was in doubt ; carried out sanitary surveys in the North-West and other areas without the services of a health inspector, and, with the assistance of officers of the Architectural and Electrical Branches of the Public Works Department, have maintained surveillance over public buildings to ensure they were safe for public use.

Regular checks were made of swimming places and 350 samples of water were submitted for bacteriological examination.

Pest Control officers of the branch carried out an intensified campaign against flies in Government institutions as part of the overall drive against flies organised by the Health Education Council.

With the co-operation of the State Gardens Board, experimental work was commenced at the Zoo to determine which of modern insecticides available was best for controlling fly breeding in manure and compost. This work is proceeding and results so far indicate that useful information will be obtained.

FOOD AND DRUGS

The labelling and packing of food was kept under review and 1,595,895 lb. of fish and 25,197 packages of meat were inspected at Fremantle Wharf.

The work of the meat inspection staff is shown in Appendix XXIII.

The first draft of proposed food hygiene regulations was prepared in time for it to be submitted for discussion by the delegates at the Annual Health Inspectors' Conference.

HEALTH INSPECTORS' CONFERENCE

The Annual Health Inspectors' Conference held at the St. John Ambulance Headquarters, Perth, on 20th and 21st September, was attended by 86 inspectors from metropolitan and country districts.

The Minister for Health, the Hon. E. Nulsen, opened the conference and welcomed the delegates.

The following addresses were given :—

Tasks for the Future (Dr. Linley Henzell, Commissioner of Public Health).

The Trachoma Eradication Project (Professor Ida Mann).

Fly Control—The Summer Campaign (Mr. C. E. Flower, Chief Inspector, Public Health Department).

Delegates were taken by bus to a metropolitan factory where the manufacture of silico-lime bricks was demonstrated.

C. E. FLOWER,
Chief Inspector (General).

Appendix XVII.

The Commissioner of Public Health

I wish to submit the following report on the activities of the Nursing Branch, 1956.

HOSPITAL INSPECTIONS

Inspections were carried out in departmental and non-departmental hospitals, including those in the Eastern Division of the Goldfields and Wiluna.

NEW MATERNITY WING

The Collie Maternity Wing was opened on 29th September. This is a very modern hospital with every facility and will accommodate 16 patients.

PRIVATE HOSPITALS

The South Perth Community Hospital was opened in April, 1956, licensed for 27 general beds.

ST. IVES MATERNITY HOME, VICTORIA PARK

This has been leased by Sisters Averill and Cooksley.

MINISTERING LEAGUE CONVALESCENT HOME, MOSMAN PARK

This is being used as an annexe for convalescent patients from the Fremantle Hospital.

ST. JOSEPH'S HOSPITAL, BICTON

This was opened in November—licensed for 34 general beds.

MOGUMBER MISSION

A new maternity wing was completed in December, 1956.

STAFFING OF COUNTRY HOSPITALS

Considerable difficulty has been experienced during the year in staffing country hospitals with trained nurses.

In an endeavour to ease the situation, Trained Nurses were recruited from the United Kingdom under our Special Nursing Scheme, whereby the applicant was given an allowance of £180 in return for two year's service in a country hospital.
Trained Nurses have now arrived and five are working in country hospitals where shortage of staff exists. One nurse is undertaking midwifery training at King Edward Memorial Hospital and will enter into her two year's contract at the completion of her training.

POST GRADUATE DIPLOMA COURSE

Government Scholarships to the value of £600 each were awarded to :—

Miss E. McGrath, Staff King Edward Memorial Hospital, to study Hospital Administration.
Miss M. Humphrey and Mrs. Johnstone to undertake the Sister Tutor Course at the College of Nursing, Australia.

HOSPITAL APPOINTMENTS

Miss Tredrea (Midwives Tutor Diploma College of Nursing, Australia) to Mt. Barker Hospital.

GOVERNMENT SCHOOL OF NURSING

The move of the School to 18 Colin Street, West Perth, has meant an increased interest in recruitment to training in a country hospital.

The " Block " living at Irwin Court is not altogether satisfactory, because the home atmosphere is lost. The entrance is grubby and untidy, and the offices, when left at the finish of the day, are most untidy and detract from a suitable home atmosphere. In addition, Meetings are conducted there in the evenings, and, on some occasions, do not finish until 11 p.m., or later. This is most disturbing to nurses who are required to be at Colin Street by 7.15 a.m. each day for breakfast.

Also, the Housekeeper, who must do domestic work, is therefore not in a very good position to supervise and direct student nurses, as is necessary, at week-ends.

It would be appreciated, by staff and students, if the nurses could be brought nearer to Colin Street. To overcome the present anomaly, it would be appreciated if thought could be given to renting a home adjacent to Colin Street, when a property becomes vacant.

Tutors

Northam.—Miss E. B. Bird has been appointed, and an improvement has been noticed at that centre.

Kalgoorlie.—The Assistant Matron was doing some supervision of teaching. On her appointment it was arranged that she would tutor, but the claim was made that this was impossible. The arrangement has been most unsatisfactory, and students from this centre lack discipline.

Geraldton.—Miss J. Irvine has continued doing most conscientious work at Geraldton.

Government School of Nursing to Acting Principal Matron.

Narrogin.—Miss Spouse has replaced Sister Budd, who did very fine work and was an excellent example to the students, who admired her immensely.

Collie.—Matron Crane has helped considerably at Collie when there has been no Tutor. Sister Mackie has returned to the staff and is helping with the nurses.

General.—At all centres the Doctors are giving bed-side clinics to the nurses. The continual criticism of certain examiners with reference to country trainees, is not always just, as one examiner only examined one country girl for Orals, and she gained a Credit in her Finals.

The large percentage of nursing assistants tends to take away junior nursing procedures from General Trainees. It would be better if training Schools could reduce the number of nursing assistants, or limit the category of employees to the State Enrolled Nursing Aides.

The School.

Miss Walsh resigned.

Miss Humphrey returned after one term at the College.

Mrs. D. Campin (*nee* Sheehan) joined the staff in September, 1956.

Mrs. J. Bulling (Typist) resigned after five years very faithful and interested service.

Mrs. Riley was appointed in her place finishing in May, 1956.

Miss Newman was engaged to replace her in May, 1956.

Miss V. A. M. Hobbs is still the only Diploma'd Tutor to the school, and this makes the teaching extremely heavy, as all Anatomy and Physiology, as well as the other lectures, are covered by the Diploma'd Tutor.

T.B. Nurses.

Successful applicants for the T.B. Course commence training with the General Trainees and do the same nine weeks P.T.S., the first group having commenced on the 2nd January, 1956. Eighteen T.B. Trainees have passed from the School to Wooroloo Sanatorium.

REPATRIATION GENERAL HOSPITAL

The nurses from the School spend each Saturday morning at Repatriation General Hospital to gain hospital ward instruction. Instrument lectures and observation of surgery is given to senior nurses.

RECRUITMENT

This is mainly limited to school visits, coupled with the showing of the film "I am a Nurse," plus the distribution of pamphlets and answering of school girl correspondence.

Visits were made to all the secondary schools, State and Private, in the Metropolitan Area, and to the following country State Schools, total number of visits amounting to 51.

SCHOOLS VISITED

Kalgoorlie and Boulder
Geraldton
Three Springs
Moora
Bullsbrook
Merredin
Cunderdin
Northam
Harvey
Collie
Narrogin
Bunbury
Busselton

York
Katanning
Kojonup
Mt. Barker
Albany
Denmark
Pemberton
Manjimup
Bridgetown
Pinjarra
St. Gertrude's, New Norcia
Stella Maria, Geraldton

NURSING BURSARIES

To December, 1956, there were 110 applicants. These had personal interviews, and aptitude tests were arranged during December, 1956. Of this total, 36 applicants were not considered suitable for Bursaries, having been assessed by the Vocational Guidance as having insufficient ability to cope with the academic work for " Leaving," but capable of doing General Training, if application and persistency were applied to that training.

Sixty-seven Bursaries were granted. Since the " Junior " results were published there have been further applications, and these are not finalised to date.

VISITS TO HOSPITALS

Busselton	3
Collie	3
Geraldton	2
Kalgoorlie	1
Merredin	2
Narrogin	2
Northam	2
Katanning	2
Mt. Henry	3

NURSES IN TRAINING

General Training	161
Commenced General Training in 1956	68
Commenced T.B. Training in 1956	15
Completed Final Registration Examinations for General Training (only one failure and that in Surgery)	42
Credits	12

TERMINATIONS

Temperamentally unsuited—Terminated	9
T.B. unsuitable at Wooroloo	3
Marriage	7
Resignation after transfer to Kalgoorlie District Hospital	4
Transferred to Nursing Aide Course—inability to do General Training	5
Terminated. Could not complete Examinations. Refused transfer to Nursing Aide	2
Resigned. No further interest in nursing	1
Wastage—19 per cent.	

NURSING AIDES

Commenced training in 1956	40
Completed N.R.B. Examination	19
Terminated	16

General.

The first Nursing Aide Trainees were transferred to Katanning District Hospital in July, 1956, and this centre has continued to have 12 to 13 Nursing Aides in training since that date.

Comments.

Mt. Henry Home employs 140 Nursing Assistants, and of this number only 20 are Nursing Aides in training. If a suitable classroom was available at this centre, this number of Aides could be doubled and more country hospitals fed from this centre.

There has been a marked increase in interest in this course, and the material available can rarely cope with General Training, but make very good, reliable assistants to the trained nurses.

I would like to express my appreciation of the help and co-operation given by Miss J. Barrott, Acting Assistant Matron, and of the excellent work of Miss E. Harler, Organiser of Nursing Training.

6th March, 1957.

ACTING PRINCIPAL MATRON.

[8]—10204.

Appendix XVIII.

NURSES' REGISTRATION BOARD

Eleven meetings were held at the Department of Public Health.

The number of nurses in the various divisions of the register, and nursing aides on the roll, whose registrations or enrolments were in force at 31st January (the date on which the register and roll were taken out for publication) was :—

General	2,418
Midwifery	2,220
Infant Health	204
Mental	63
Tuberculosis	57
Mothercraft	35
Nursing Aides	107
Dental	12

In February the District Hospital, Katanning, was approved as a training school for nursing aides.

Twenty-two examinations were conducted as follows :—

General	3
Midwifery	3
Mental	3
Tuberculosis	3
Mothercraft	3
Nursing Aides	3
Dental	1
First Professional	3

Six applications for restoration of name to the midwives' register were approved under section II (3) of the Act.

Appendix XIX.

INCIDENCE AND MORTALITY OF NOTIFIABLE INFECTIOUS DISEASES.

Diseases Notifiable.	1953.			1954.			1955.			1956.		
	Cases Re-ported.	Amended Diag-nosis.	Deaths.	Cases Re-ported.	Amended Diag-nosis.	Deaths.	Cases Re-ported.	Amended Diag-nosis.	Deaths.	Cases Re-ported.	Amended Diag-nosis.	Deaths.
Acute Rheumatism	24	24	(C) 4	60	60	(C) 8	39	39	(C) 8	21	21	(C) 3
Amoebiasis	....	....	....	8	8	....	2	2	1	7	7	....
Ankylostomiasis	2	2	....	2	2	....	1	1	1	1	1	1
Brucellosis	7	7	....	8	8	....	5	5	....	3	3	....
Chorea	6	6	1	6	6	....	4	4	....	1	1	....
Dengue Fever	1	1	....	2	2	....	....	....	....	....	....	....
Diphtheria	195	170	1	127	119	3	547	480	6	159	145	1
Dysentery (Amoebic)	6	6	....	6	6	1	7	7	1	9	9	1
Dysentery (Bacillary)	42	42	....	42	42	1	27	127	....	71	71	3
Encephalitis, Lethargic	3	3	....	....	....	3	....	....	1	2	2	1
Erythema Nodosum	2	2	....	1	1	....	....	....	....	1	1	....
Hydatid	....	....	....	....	....	1	1	1	1	....	....	1
Infantile Diarrhoea	4	4	(A) 8	29	29	(A) 22	30	30	9	48	48	8
Infective Hepatitis	443	443	1	166	165	4	254	254	7	181	181	4
Lead Poisoning	5	5	1	2	2	....	3	3	....	13	13	1
Leprosy	26	26	1	47	47	....	29	29	....	34	34	....
Malaria	25	25	....	29	29	1	5	5	....	6	6	....
Meningococcal Infection	25	25	6	48	48	3	13	13	4	13	13	2
Paratyphoid	1	1	....	1	1	....	4	4	....	....	....	....
Poliomyelitis	49	44	3	450	436	4	34	33	1	416	401	15
Pleural Effusion	9	8	....	4	4	1	12	12	....	5	5	1
Puerperal Fever	3	3	....	2	2	....	5	5	....	1	1	....
Purulent Ophthalmia	163	163	....	52	52	....	35	35	....	31	31	....
Rubella	1,053	1,053	....	627	627	....	227	227	....	85	85	....
Salmonella Infection	17	17	....	32	32	1	58	58	....	27	27	....
Scarlet Fever	94	93	....	92	91	....	69	68	1	57	57	....
Tetanus	12	12	6	4	4*	8	9	9	5	15	15	10
Tetanus Neonatorium	....	....	....	....	....	....	....	....	....	1	1	....
Trachoma	1,201	1,201	....	3,686	3,686	....	1,470	1,470	....	280	280	....
P.T.B.	376	370	43	368	344	57	408	401	31	429	419	43
Other T.B.	34	33	3	26	34	4	39	39	2	43	44	3
Typhoid Fever	7	7	....	12	12	1	13	13	1	8	8	....
Typhus Fever	18	18	....	19	19	....	22	22	1	16	16	....

Deaths exclude Full-blood Aboriginals.

(A) Gastro-enteritis and Colitis (except ulceration) under two years and diarrhoea of newborn.

(B) Also one death from other or unspecified dysentery.

(C) Rheumatic Fever.

* Notifications incomplete.

Appendix XX.

MATERNAL MORTALITY.

Period.	Average Live Births.	Average Maternal Deaths.	Average Rate.
1901–1905	6,681	28·0	4·19
1906–1910	7,691	43·4	5·64
1911–1915	8,844	39·4	4·46
1916–1920	7,727	41·4	5·36
1921–1925	8,056	34·2	4·25
1926–1930	8,748	46·8	5·35
1931–1935	8,062	35·4	4·39
1936–1940	8,877	32·4	3·65
1941–1945	10,408	24·4	2·34
1946–1950	13,130	21·4	1·63
1951–1955	15,724	13·8	0·88

Year.	Live Births.	Deaths From.									
		Puerperal Septicaemia.		Other Puerperal Infections.		Abortion.		All other Complications of Pregnancy and of the Puerperal State.		All Complications of Pregnancy and the Puerperal State.	
		No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
1943	10,481	2	0·19	1	0·10	3	0·29	17	1·62	23	2·19
1944	10,870	2	0·18	2	0·18	5	0·46	18	1·66	27	2·48
1945	10,672	....	....	2	0·19	5	0·47	13	1·22	20	1·87
1946	12,105	....	....	3	0·25	5	0·41	18	1·49	26	2·15
1947	12,874	1	0·08	1	0·08	8	0·62	22	1·71	32	2·49
1948	12,981	2	0·15	4	0·31	1	0·08	13	1·00	20	1·55
1949	13,511	....	....	2	0·15	3	0·22	11	0·81	16	1·18
1950	14,228	....	....	2	0·14	1	0·07	12	0·84	13	0 91
1951	14,794	....	....	2	0·14	3	0·20	11	0·74	16	1·08
1952	15,413	....	....	3	0·19	3	0·19	12	0·78	18	1·17
1953	15,862	....	....	....	....	1	0·06	8	0·50	9	0·57
1954	15,928	....	....	....	....	5	0·31	7	0·44	12	0·75
1955	16,623	....	....	....	....	1	0·06	13	0·78	14	0·84
1956	16,916	....	....	....	....	2	0·12	7	0·41	9	0·53

All rates per thousand live births,

Appendix XXI.

STILLBIRTH AND INFANT MORTALITY RATES.

Year.	Total Births including Stillbirths.	Stillbirth Rates.	Neo-Natal Rates.		Total Mortality Rates under One Year.	Other Post Natal Rates Over One Month and Under One Year.
			Under One Week.	Under One Month.		
1926	8,534	27·4	....	27·6	48·0	20·4
1927	8,708	26·0	....	23·0	44·7	21·7
1928	8,981	30·9	....	23·1	35·5	12·4
1929	9,316	28·4	18·8	25·8	54·6	28·8
1930	9,456	27·0	18·0	23·5	46·5	23·0
1931	8,777	26·0	20·1	26·6	40·5	13·9
1932	8,175	25·7	21·02	25·2	43·5	18·3
1933	8,105	29·4	18·1	22·5	35·8	13·3
1934	8,029	29·2	19·3	24·8	38·8	14·0
1935	8,377	30·8	20·6	24·8	39·0	14·2
1936	8,730	28·9	19·6	24·8	41·0	16·2
1937	8,850	27·2	16·8	21·2	36·5	15·3
1938	9,325	23·9	16·6	19·1	33·1	14·0
1939	9,249	23·0	16·5	19·7	40·0	20·3
1940	9,363	25·9	20·5	24·9	43·0	18·1
1941	10,375	24·8	15·1	18·1	34·4	15·7
1942	10,109	20·6	17·1	20·3	36·2	15·9
1943	10,759	25·8	17·1	21·0	31·8	10·8
1944	11,144	24·6	18·6	21·0	32·0	11·0
1945	10,896	20·6	18·0	20·0	28·9	8·9
1946	12,398	23·1	17·1	20·6	30·3	9·6
1947	13,178	23·2	16·9	19·4	30·2	13·2
1948	13,197	20·5	16·9	18·7	25·0	8·4
1949	13,779	19·4	16·2	19·0	25·9	6·8
1950	14,468	16·6	16·2	18·0	26·7	8·6
1951	15,091	19·7	16·2	19·7	28·2	8·5
1952	15,697	18·1	15·5	17·7	24·5	6·8
1953	16,130	16·6	13·4	16·2	23·4	7·3
1954	16,198	16·7	14·2	15·8	22·2	6·4
1955	16,862	14·2	13·3	15·8	22·1	6·3
1956	17,142	13·2	13·0	15·7	22·4	6·7

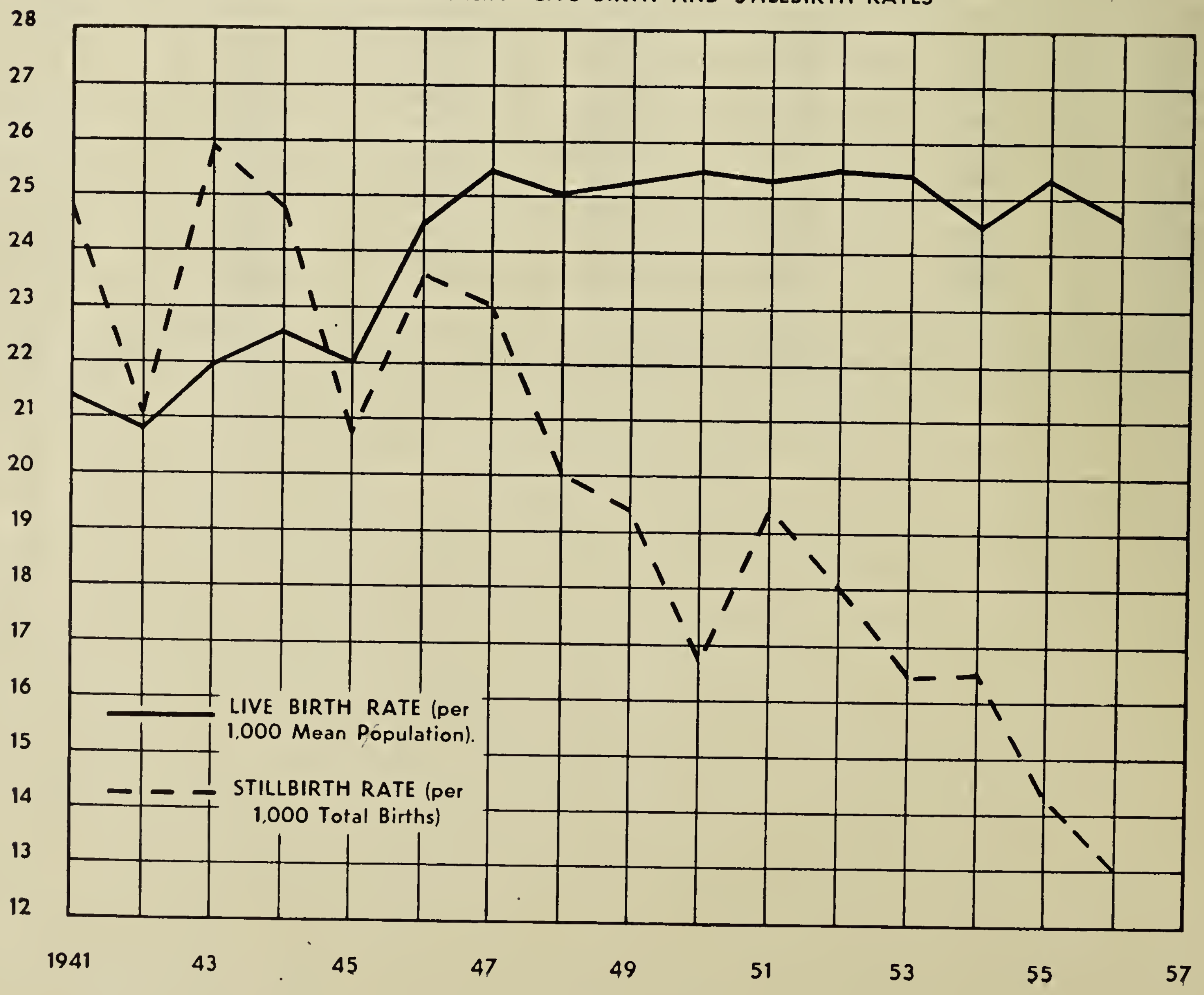
In above table all rates are calculated in deaths per 1,000 of total births, including stillbirths.

Appendix XXII

WESTERN AUSTRALIA—STILLBIRTH AND BIRTH RATES.

Year.	Mean Population.	Live Births.		Still Births.	
		Number.	Rate per 1,000 Mean Population.	Number.	Rate per 1,000 Total Births.
1941	473,968	10,118	21·35	257	24·77
1942	476,619	9,901	20·77	208	20·57
1943	476,745	10,481	21·98	278	25·84
1944	481,498	10,870	22·58	274	24·59
1945	487,510	10,672	21·89	224	20·56
1946	492,771	12,105	24·57	293	23·63
1947	502,951	12,874	25·60	304	23·07
1948	514,621	12,931	25·13	266	20·16
1949	532,603	13,511	25·37	268	19·45
1950	557,878	14,228	25·50	240	16·59
1951	580,317	14,794	25·49	297	19·68
1952	600,615	15,413	25·66	284	18·09
1953	621,034	15,862	25·54	268	16·62
1954	640,140	15,928	24·88	270	16·67
1955	658,747	16,623	25·23	239	14·17
1956	677,317	16,916	24·98	226	13·18

WESTERN AUSTRALIA – LIVE BIRTH AND STILLBIRTH RATES



Appendix XXIII

MEAT INSPECTION FOR YEAR ENDED 31ST DECEMBER, 1956

No. of Animals Slaughtered		Carcasses Condemned								Part Carcasses Condemned					Organs Condemned				
		Tuber-culosis	Actino-mycosis	Piroplas-mosis	Caseous Lympha-denitis	Para-typhoid	Traumatic and Septic	Pleuro-Pneumonia	Other Ab-normalities	Actino-mycosis	Caseous Lympha-denitis	Tuber-culosis	Arthritis	Other Ab-normalities	Actino-mycosis	Echino-coccosis	Pleuro-Pneumonia	Tuber-culosis	Other Ab-normalities
Fremantle District (including Watson's)																			
Cattle	21,729	32	....	75	....	....	30	....	396†	186	....	58	....	185†	....	....	....	....	40,415†
Calves	65	....	....	....	....	....	....	....		....	....	....	....		....	....	....	....	
Sheep	243,152	....	....	....	11	....	143	....		....	225	....	275		....	147*	....	1*	
Pigs	72,665	76	....	....	....	31	54	....		....	....	2,222	282		....	....	....	....	
Midland Junction (including Foggitt's)																			
Cattle	59,252	130	1	51	....	....	101	52	1,286†	687	....	182	....	358†	....	....	....	....	39,584†
Calves	3,483	....	....	....	....	....	....	....		....	....	....	....		....	....	....	....	
Sheep	515,943	....	....	....	16	....	317	....		....	556	....	713		....	273*	....	160*	
Pigs	51,210	84	....	....	....	21	11	....		....	....	180	58		....	....	....	....	
Kalgoorlie																			
Cattle	3,438	8	....	....	....	....	2	....	27†	14	....	78	....	59†	....	....	....	....	2,015†
Calves	24	....	....	....	....	....	....	....		....	....	....	....		....	149*	....	5*	
Sheep	38,342	....	....	....	2	....	13	....		....	28	....	8		....	....	....	....	
Pigs	2,256	2	....	....	....	....	....	....		....	....	11	....		....	....	....	....	
Perth Meat Markets																			
Cattle	1,745	....	....	....	....	....	....	....	190†	....	....	1	....	48†	....	....	....	....	13†
Calves	26,234	....	....	....	....	....	....	....		....	....	....	....		....	....	....	....	
Sheep	638	....	....	....	....	....	....	....		....	....	....	....		....	....	....	....	
Pigs	756	....	....	....	....	....	....	....		....	....	1	....		....	....	....	....	
Fremantle Meat Markets																			
Cattle	294	1	....	....	....	....	....	....	10†	....	....	....	....	....	....	....	....	....	3†
Calves	1,723	....	....	....	....	....	....	....		....	....	....	....		....	....	....	....	
Sheep	29	....	....	....	....	....	....	....		....	....	....	....		....	....	....	....	
Pigs	44	....	....	....	....	2	....	....		....	....	....	....		....	....	....	....	
Country Districts—Albany, Bunbury, Busselton, Collie, Geraldton, Harvey, Katanning, Manjimup, Narrogin and Northam																			
Cattle	19,654	14	....	....	....	....	13	....	276†	43	....	13	....	562†	....	....	....	....	7,387†
Calves	2,872	....	....	....	....	....	....	....		....	....	....	....		36	228*	....	53*	
Sheep	155,134	....	....	....	22	....	24	....		....	94	....	67		....	....	....	....	
Pigs	8,562	9	....	....	....	2	11	....		....	....	58	23		....	....	....	....	
		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Totals, Cattle	106,112	0·01	....	0·01	....	....	0·01	....	0·01†	0·08	....	0·03	0·14	0·98	....	....	....	....	6·6
Calves	34,401	....	....	....	....	....	....	....		....	....	....	....		0·03	0·06 *	....	0·09*	
Sheep	953,238	....	....	....	0·06	....	0·06	....		....	0·01	....	....		....	....	....	....	
Pigs....	135,493	0·01	....	....	....	0·04	0·05	....		....	....	1·8	0·02		....	....	....	....	

† All non-listed abnormalities expressed over all types.

* Figure for susceptible types only (Pigs and Cattle).

Appendix XXIV.

REVENUE AND EXPENDITURE FOR YEAR 1956

REVENUE

	£	s.	d.
Licence Fees	39	10	0
Meat Inspection Fees	17,867	14	11
Fish Inspection Fees	437	6	3
Pathological Laboratory	4,594	3	8
Sanitation Refunds	1	7	0
Inspection of Plans (Septic Tanks)	11,044	19	6
Miscellaneous	7,190	12	9
Nurses and Midwives Registration and Examination Fees	2,116	18	5
T.B. Diagnosis (Generally)	478,422	7	9
T.B. Diagnosis (Wooroloo)	37,711	7	8
Health Supervision Charges	798	11	7
Baby Patterns	27	0	6
Hospital Benefits—Lepers	536	16	0
Supplementary and Organisation Benefits—Lepers	203	8	0
Poliomyelitis After Care	2,006	9	0
Immunised Diphtheria	522	8	0
Infectious Diseases	4,049	5	9
Pesticide Registration	148	5	9
	£567,718	11	10

EXPENDITURE

	£	s.	d.
Salaries (including Tuberculosis)	466,034	2	7
Infectious Diseases	23,185	13	11
School Medical and Dental Services	18,682	4	8
School Medical Doctors and Nurses Travelling	2,042	2	9
Dental Bursaries (from May, 1956)	1,714	6	6
School Dentists Travelling and Expenses	4,607	14	1
Travelling and Transport Generally	3,323	12	10
Travelling and Transport Commissioner and Medical Officer	1,686	1	6
Ophthalmic Survey	3,309	12	8
Postage and Telephones	1,914	11	4
Laboratory	14,330	2	3
Venereal Diseases	3,902	19	5
Infant Welfare Centres	98,752	11	0
Maintenance and Transport Lepers	24,499	5	11
Poliomyelitis	41,244	6	2
Sanitation Government Buildings	17,756	8	1
Health Education	5,105	4	7
Tuberculosis Clinics	271,565	16	7
Miscellaneous	38,603	0	10
	£1,042,259	17	8

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